



United States
Department of
Agriculture

In cooperation with the
Montana Agricultural
Experiment Station



Natural
Resources
Conservation
Service



MT622—Soil Survey of Gallatin County Area, Montana

Part I



The original maps and tables have been deleted from this online version. Since the soil survey's publication, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/>).

How to Use This Soil Survey

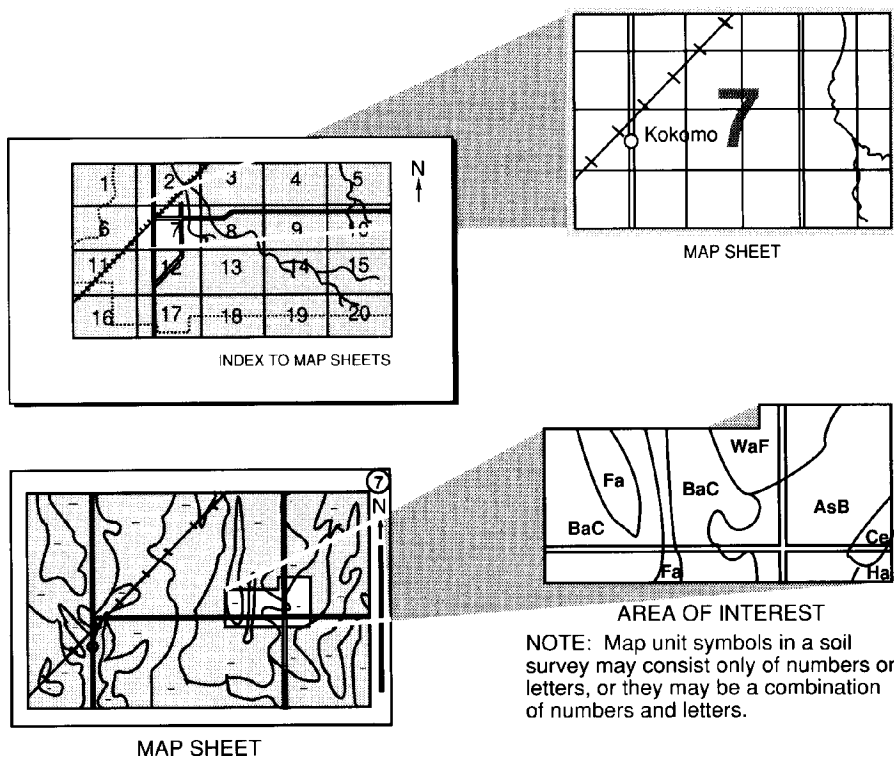
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, you can locate the Section, Township, and Range by zooming in on the **Index to Map Sheets**, or you can go to the Web Soil Survey at (<http://websoilsurvey.nrcs.usda.gov/app/>).

Note the map unit symbols that are in that area. The **Contents** lists the map units by symbol and name and shows the page where each map unit is described.

See the Contents for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1995. Soil names and descriptions were approved in 1996. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. This survey was made cooperatively by the Natural Resources Conservation Service and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Gallatin County Conservation District.

The most current official data are available through the NRCS Soil Data Mart website at <http://soildatamart.nrcs.usda.gov>. Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: This view of the snow-covered Bridger Mountains contains both private and public lands. The foreground soils of Adel-Copenhaver complex and the drainageway soils of Bridger-Redlodge complex are on private land while the Yellowmule-Lonnibee, stony complex soils in the timber-covered foothills are on public land. The public land, including the Bridger Mountains, has been mapped in the "Soil Survey of Gallatin National Forest, Montana" (1996).

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.

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Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

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Soil Survey of Gallatin County Area, Montana

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United States Department of Agriculture, Natural Resources Conservation Service,
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How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. This information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the survey area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, soil scientists develop a concept, or model, of how the soils were formed. During mapping, this model enables soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually

change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates; kind and amount of rock fragments; distribution of plant roots; reaction; and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret data from these analyses and tests as well as field-observed characteristics and

soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data for crop yields under high levels of management are modeled and validated with farm records and field or plot information on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Descriptions, names, and delineations of the soils in this survey area may not fully agree with those of the soils in adjacent survey areas. Differences result from a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Nature of the Survey Area

Gallatin County Area is located in southwestern Montana (fig. 1). The survey area is located in Major Land Resource Areas 43 and 44 and consists of Gallatin County and a small portion of southeastern Broadwater County. Bozeman, the county seat, is located in the north-central part of the county. The survey area includes 879,100 acres or approximately 1,374 square miles. National forest areas within Gallatin County were not included in this survey.

The Gallatin County Area is part of the Missouri River drainage system. Most of Gallatin County drains directly into the Missouri River through the Gallatin, Madison, and Jefferson rivers. The area consists of about 14 major geologic formations.

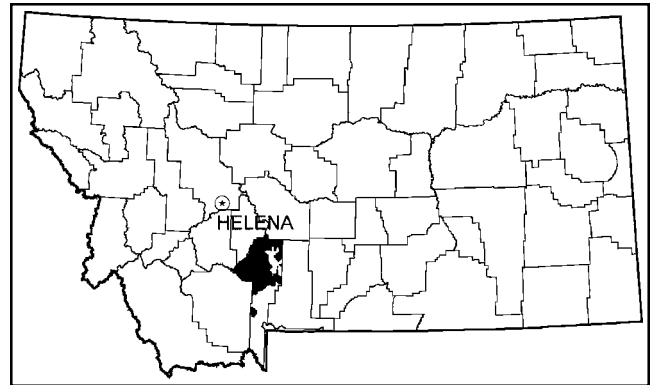


Figure 1.—Location of Gallatin County Area, Montana

This soil survey updates the “Soil Survey of the Gallatin Valley Area, Montana” (DeYoung and Smith, 1931). The present survey provides additional information and has larger maps, which show the soils in greater detail.

History

Much of the material used in this section is courtesy of the Gallatin County Historical Society.

The native people who lived in the region referred to much of the area of modern-day Gallatin County as the “Valley of Flowers.” It was a productive hunting ground, and the tribes who shared its resources treated it as neutral communal territory. The county contained many species of wildlife and plants important to the existence and lifestyle of Native American tribes, such as the Bannock, Blackfeet, Crow, Flathead, Nez Perce, Shoshone, and Sioux.

In the late 18th century, European trappers in search of beaver and other fur resources were probably the first to arrive in what later would become Gallatin County.

The Lewis and Clark Expedition reached the headwaters of the Missouri River near the town of present-day Three Forks on July 21, 1805. They named the three rivers that form the Missouri River for presidents, Thomas Jefferson and James Madison, and for then-Secretary of the Treasury, Albert Gallatin. In 1810, explorers from the Missouri Fur Company established a trading post at the Missouri River headwaters. No lasting settlement occurred, and the post was abandoned after a short time. For the next several decades, trappers, fur traders, and other explorers continued to visit the area sporadically, until the discovery of gold in Alder Gulch near what is known today as Virginia City in Madison County.

In 1863, John Bozeman, an explorer and entrepreneur from Georgia, established a northern spur, soon known as the Bozeman Trail, off the Oregon Trail. During the three years that the Bozeman Trail was open, thousands of miners passed over it on their way to the gold fields. A section of the trail traveled west through the area that would later become Gallatin County.

In 1864, John Bozeman, W. J. Beall, and Daniel Rouse were responsible for developing a small trading settlement in Gallatin County. This settlement was a means of supplying the large influx of miners passing through the county on their way to the gold fields. This site was approximately 35 miles from the Missouri River headwaters toward the eastern side of the county, located in a fertile valley near the point where the Bozeman Trail left the mountains. After experiencing failure in the gold fields, many former gold-seekers returned to the productive lands of this valley to take up farming and ranching. In 1864, pioneer Nelson Story drove the first cattle herds to the area from Texas, and agriculture in the county continued to expand.

In February 1865, the first territorial legislature of Montana created Gallatin County. Gallatin City, a small settlement founded near the Missouri River headwaters, was initially declared the county seat.

In 1867, in accordance with the Treaty of Fort Laramie, the Bozeman Trail was closed, and the original trading settlement began to take on a more permanent character. During the same year, the population had grown sufficiently enough for the town to be declared the new county seat; it was named "Bozeman." Gallatin City, the old county seat, was later abandoned.

In 1867, Fort Ellis was established a few miles to the east of Bozeman in response to the conflicts with Native American tribes in the region over continuing settler infringement on native lands. The fort also served as a base for exploration of the area that would become Yellowstone National Park. Fort Ellis, along with its associated personnel, provided an additional market for local agricultural products, fostering further economic growth within the county.

The county's population growth remained relatively slow until 1883, the year it was linked to the rest of the country by the Northern Pacific Railway. Bozeman was incorporated as a city at this time, and the county began slow but steady population and economic growth. The major industries were farming, ranching, mining, and logging. Other major towns in the county, such as Belgrade, Manhattan, and Three Forks, were subsequently incorporated along the rail-line. Montana Agricultural College (later renamed

Montana State University) was founded as a land-grant institution in Bozeman. The first classes, held in the fall of 1893, had eight students in attendance. Such an event was indicative of the county's permanent transition to a stable and economically viable area.

Industry and Transportation

According to the 2000 census, the current population of Gallatin County is 67,831 persons residing in a land area covering 1,620,787 acres. Out of those acres, 614,357 are federally owned, including U.S. Forest Service and Bureau of Land Management lands. Private lands in the county total 991,902 acres, with about one-third of those acres used for rangeland. Another 200,000 acres consist of irrigated and nonirrigated cropland with mainly small grains, alfalfa, and potatoes under cultivation. The remaining acres consist of forest land, hayland, and pasture as well as urban and built-up areas.

The economy of Gallatin County has historically been agriculturally based, with over 66-million dollars in combined receipts from crops and livestock in 1993. Extractive industries, such as logging and mining, continue to be significant as well. The county's economy has depended heavily on tourism since the early 1900s, when the railroad began promoting Yellowstone National Park as a tourist destination. Recreational opportunities, including angling, backpacking, backcountry skiing, downhill skiing, hiking, hunting, rafting, and snowmobiling, draw millions of tourist dollars into Gallatin County every year. Montana State University and its associated personnel, students, and activities, along with sectors of the state and federal government, also play a major role in the local economy. Development and population growth has occurred at a steady pace within the county in recent years. Although most of the employment areas, such as retail trade, manufacturing, and the service industry, have shown significant growth, farming and extractive industries have shown a slight decrease.

Two major highways currently serve the Gallatin County Area. U.S. Interstate 90 travels east and west through Gallatin County and connects the county with both coasts. Interstate 90 follows approximately the same route through the county as taken by the old Bozeman Trail. The main rail-line through the county also parallels this same route. U.S. Highway 191 runs south nearly to the Idaho border where it connects with U.S. Highways 287 and 20, which branch into Idaho, Yellowstone National Park, and north into Madison County. Numerous paved state highways

and secondary roads also serve the survey area. Gallatin Field, located 9 miles west of Bozeman, is a major airport for southwestern Montana, providing both major and commuter airline services.

Physiography and Drainage

The soil survey area lies near the southern border of the Northern Rocky Mountain physiographic province and at the junction of four tectonic provinces. The Continental Divide forms the southern boundary of Gallatin County.

Gallatin County contains portions of five mountain ranges: the Bridger Range, which trends north-south across the northeastern portion of the county; the Gallatin Range, which runs north-south and forms the eastern boundary of the county; the Madison Range, which also trends north-south and forms the southwestern boundary of the county; the Horseshoe Hills, which trend northeast-southwest on the northern end of the county; and the southern end of the Big Belt Mountains, which run along the northern boundary of the survey area in southern Broadwater County.

A large, open intermountain valley, surrounded by rugged, mountainous terrain characterizes the county. The Gallatin, Madison, Yellowstone, and Missouri river systems drain the mountains. The Bridger Range has high relief, with extensive alluvial fans and minor glacial features. The Gallatin and Madison ranges also have high relief, with glacially sculpted valleys and narrow river canyons. The Horseshoe Hills have relatively low relief.

Roughly half of the county is included in the survey area, which extends from the West Fork of the West Gallatin River north to Three Forks and includes Spanish Creek Basin and the foothills along the western side of the Gallatin Range. To the north, the survey area takes in the western and eastern sides of the Bridger Range, the Gallatin and northern Madison valleys, the Horseshoe Hills, and the southern end of the Big Belt Mountains. Elevations in the survey area range from a low of 3,960 feet (1,207 m) above sea level near Clarkston to a high of approximately 8,760 feet (2,670 m) at the head of Beaver Creek in the southwestern part of the survey area. The peaks in the Bridger Mountains range from 8,900 feet (2,713 m) to 9,650 feet (2,941 m) above sea level. Mount Chisolm and Mount Bole in the Gallatin Range within Gallatin County each rise to an elevation of 10,333 feet (3,150 m). The highest peak in Gallatin County is Mount Wilson in the Spanish Peaks Wilderness Area with an elevation of 10,700 feet (3,261 m). Areas not

included in this soil survey consist mostly of high, mountainous terrain and the Hebgen Lake and West Yellowstone areas. Nearly all U.S. Forest Service lands, including portions of the Lee Metcalf Wilderness, and large parcels of private timber company lands were not included in this survey but are included in the published soil survey of Gallatin National Forest.

The Missouri River and its tributaries drain the soil survey area. The West Gallatin River drains the southern portion of the survey area, joining the East Gallatin River at Manhattan. The Madison and Jefferson rivers drain the western part of the survey area and converge with the Gallatin River north of the town of Three Forks to form the Missouri River. Bridger Creek drains the southern end of the Bridger Range and joins the East Gallatin River near Bozeman. The East Gallatin River drains the western side of the Bridger Range. The Shields River on the eastern side and Sixteenmile Creek to the north drain the Bridger Range. In the southern end of the survey area, the West Fork and Spanish Creek join the West Gallatin before flowing out into the broad Gallatin Valley.

Geologic History and Regional Geology

The geologic record of Gallatin County began approximately 2.5 billion years ago in the early Precambrian, or Archean, Eon with the intense metamorphism of existing sedimentary and igneous rocks. This "basement complex" consists mainly of hard, coarse-grained amphibolite gneiss. These rocks are found in both the Gallatin and Madison ranges and in the southern end of the Bridger Range.

In late Precambrian time, during the Proterozoic Eon, a thick sequence of sedimentary rocks known as the Belt Supergroup were deposited in western Montana in basins bounded by normal faults. These sediments consist primarily of siltstone, sandstone, and some limestone. Locally, rocks from the LaHood Formation were deposited as blocks of Archean basement rock were uplifted and eroded.

Since late Precambrian time, rising and falling inland seas have inundated the survey area. During this time, varieties of sedimentary rocks were deposited in both marine and terrestrial environments. Rocks of the Belt Supergroup were subsequently buried and subjected to low-grade metamorphism. Nearly all of the geologic time scale is represented in Gallatin County except portions of the early Paleozoic Era.

The prominent structural features visible today began forming approximately 65 million years ago in

the Early Tertiary Period. Intense folding and faulting occurred as the result of crustal collisions to the west. Rocks of the Belt Supergroup were faulted and moved to the east where they are presently exposed in portions of northern Gallatin County. Continued structural activity uplifted and folded older rocks to form the ancestral Rocky Mountains. Regional extension during the mid-Eocene caused down dropping of the Three Forks Basin and the relative uplift of the Bridger Range. Erosion of these newly formed mountains produced sediment that was deposited in tectonic basins from late in the Tertiary Period to the present.

The Tertiary Period was also a time of intense volcanic activity associated with the Boulder Batholith to the west and the Absaroka-Gallatin Volcanic Field to the east. Volcanic sediments are found in much of the Tertiary valley fill deposits in the Gallatin Valley. The upper elevations of the Gallatin Range are composed mainly of Tertiary-age volcanic rocks from the Absaroka-Gallatin field.

In the Belgrade area, thick deposits of alluvium accumulated as the Three Forks Basin continued to subside. Concurrently, alluvial fans formed along the Bridger and Gallatin ranges, and the hills in the Camp Creek area southeast of Belgrade were eroded and terraced. In late Pleistocene time, these alluvial fans were dissected and new fans, including portions of the “Bozeman Fan” south of Bozeman, were deposited. Alluvium continued to accumulate in the Belgrade basin to a depth of 400 to 600 feet (120 to 180 m).

The Pleistocene was also a time of intense glacial activity, which affected most of the mountainous areas in Gallatin County. Evidence of two separate events, named the Bull Lake and Pinedale glaciations, can be identified in this part of Montana. Bull Lake glaciation is estimated to have occurred between 250,000 and 130,000 years ago. Pinedale glaciation was active from 70,000 to 12,000 years ago, with major peaks at 30,000 and 15,000 years before present. During these episodes, alpine glaciers surrounded the high peaks, eroding U-shaped valleys and depositing linear moraines and glacial outwash at lower elevations. Deposits of glacial till and outwash mantle the floors of many of the mountain valleys and are especially well preserved along Fairy Creek in the Bridger Range and in the Spanish Creek Basin. Periglacial processes (significant frost action) are ongoing in the high mountains today; however, there are no true glaciers. There are snowfields at high elevations in most of the ranges and active rock glaciers in the Madison Range.

Geologic Units

The sequence of rocks exposed in the survey area is summarized below, listed in order of decreasing age. Rock units are classified as formations based on lithology and stratigraphic position, and they may be subdivided into members or combined into groups or supergroups. Systems are the rocks deposited during a particular geologic period. In many cases, outcrop areas for individual formations are small and difficult to differentiate in the field. Typical soils are listed where there are sufficient exposures of a particular formation to characterize the soils.

Precambrian Age—4.5 billion to 570 million years before present (mybp)

The oldest rocks in Gallatin County belong to the basement complex of Archean, or early Precambrian (3.8 to 2.5 bybp), which contains amphibolite gneiss, mica schist, and pegmatite of varying composition. These rocks are exposed in the Spanish Peaks, the southwestern end of the Bridger Range, and parts of the Madison River Valley. Typical soils derived from these metamorphic rocks include the Barbarela, Bielenberg, Breeton, Jaegle, Nuley, Poin, Rentsac, Rochester, and Shurley series.

The Proterozoic, or late Precambrian (2.5 by to 570 mybp) Belt Supergroup, which contains argillite, quartzite, limestone, and dolomite, follows the Archean. These sediments often show well-preserved features such as ripple marks and mud cracks. The Belt Supergroup crops out in the Big Belt Mountains, the southern Horseshoe Hills, and the northern end of the Bridger Range. Soils derived from these rocks are the Blaincreek, Tolbert, Tolex, and Uinta series.

The mid-Proterozoic LaHood Formation, found in the Bridger Range and the Horseshoe Hills, consists of sandstone and conglomerate shed from older, basement complex gneiss and schists. Representative soils formed in this formation include the Catgulch and Sawicki series.

Early to Late Paleozoic Era—570 to 300 mybp

During the time from the Cambrian to the early Pennsylvanian periods, which occurred between 570 and 300 million years ago, oscillating seas invading from the west covered most of Montana with beach sands and thick marine deposits.

The rocks of the Cambrian Period (570 to 505 mybp) have been divided into the following: Flathead (sandstone and shale), Wolsey (shale), Meagher

(limestone), Park (shale), Pilgrim (limestone), and Snowy Range (limestone and shale) formations. The carbonate rocks form resistant ridges, most notably the crest of the Bridger Range. The less-resistant shales form swales between carbonate rock outcrops.

Most Ordovician-age (505 to 438 mybp) sediments have been eroded, and Silurian-age (438 to 408 mybp) rocks were apparently never deposited here.

Rocks from the Devonian Period (408 to 360 mybp) have been divided into the Maywood (dolomite), Jefferson (limestone), Three Forks (dolomite), and Sappington (siltstone) formations. Mississippian-age (360 to 320 mybp) rocks consist of the Lodgepole and Mission Canyon limestones, which are combined into the Madison Group, and the lower Amsden (shale) Formation. Typical soils mapped in limestone include the Crago, Hanson, Lap, Musselshell, Pensore, Whitecow, Whitore, and Windham series. The Accola, Hanson, Tiban, and Whitore series are often associated with the Amsden Formation.

Late Paleozoic to Early Mesozoic Eras—300 to 100 mybp

During this time, oscillating seas were largely restricted to southern Montana. These seas were closer to landmasses than earlier Paleozoic seas and received more river-transported sediment. Both marine and nonmarine shale, sandstone, and minor limestone were deposited. As the seas retreated, shales and sandstones were deposited on coastal flood plains and in freshwater lakes.

Rocks of the upper Pennsylvanian Period (300 to 286 mybp) include the Amsden (shale) and Quadrant (sandstone) formations. The Quadrant Formation is a prominent ridge-former in some areas. Soils formed on the Quadrant Formation include the Castner, Cowood, Danaher, Loberg, Rocko, Stemple, Tolbert, and Vision series.

The Permian Period (286 to 245 mybp) is represented by the Phosphoria Formation, which consists of dolomite, limestone, and phosphatic shale.

The Jurassic System (208 to 144 mybp) has been divided into the Sawtooth (shale), Rierdon (calcareous shale and limestone), Swift (sandstone), and Morrison (siltstone and shale) formations. Typical soils on the Morrison Formation are the Accola, Hanson, and Whitore series.

Rocks from the lower Cretaceous Period (144 to 100 mybp) include the Kootenai Formation (conglomerate and sandstone) and the Colorado Group. The Colorado Group has been subdivided into the Thermopolis (shale), Muddy (sandstone), Albino

(shale), Frontier (shale), and Cody (shale) formations. These shales are often involved in landslides. Typical soils on the Kootenai Formation include the Cowood, Loberg, Tolbert, and Vision series. Soils formed in the Colorado Group include the Bacbuster, Bangtail, Cabba, Castner, Ouselfal, Reedwest, Tolbert, Wilsall, and Yellowmule series.

Late Mesozoic Era (Upper Cretaceous Period)—100 to 65 mybp

Most of Montana was again covered by oscillating seas that advanced to the west and deposited thick sequences of shale. The Montana Group, which includes the Telegraph Creek (shale) and Eagle (shale and sandstone) formations, represents the Late Mesozoic Era. The upper Cretaceous Livingston Group includes the Cokedale (andesitic siltstone and bentonite), Miner Creek (andesitic siltstone and sandstone), and Billman Creek (shale and siltstone) formations. These shales and sandstones are also involved in landslide deposits, especially in the Bozeman area. Soils formed in these sediments include the Bangtail, Billman, Burnel, Wilsall, and Yellowmule series.

Early Cenozoic Era—65 to 37 mybp

The Early Cenozoic was a time of intense structural activity that included the formation of the Rocky Mountains. There was extensive volcanism at this time, which affected the Rocky Mountains and some of the plains mountains as well. As the mountains rose and the Late-Cretaceous seas withdrew, they deposited an eastward-thinning wedge of sandstone with some clayey shale along the coastline.

The Tertiary Period (66 to 1.6 mybp) has been subdivided into five epochs. The earliest, the Paleocene Epoch (66 to 58 mybp), is represented by the Hoppers Formation (sandstone) of the upper Livingston Group and the Fort Union Formation (conglomerate, sandstone, and siltstone). Soils mapped in the Hoppers and Fort Union formations include the Copenhaver, Hoppers, and Timberlin series.

The Paleocene Epoch was followed by the Eocene Epoch (58 to 37 mybp), which is locally represented by the Absaroka-Gallatin Volcanic Field. These thick andesite lavas, flow breccias, and terrestrial sediments cover much of the Gallatin Range but are outside of the soil survey area. Deposition of these sediments and volcanic rocks continued throughout the Tertiary Period and into the Holocene Period.

Mid-Late Cenozoic Era (37 mybp to present)

By the end of Eocene time, the ancestral Rocky Mountains had largely been leveled by erosion. Tensional block faulting followed this leveling. Tensional block faulting uplifted mountains and down dropped valleys, forming the present-day topography of Montana. Faulting intermittently blocked drainages in the valleys, producing thick deposits of soft sediments. Ongoing volcanic activity resulted in large interbeds of volcanic ash within the valley fill sediments.

The late Tertiary Period consists of the Oligocene (37 to 24 mybp), Miocene (24 to 5.3 mybp), and Pliocene (5.3 to 1.6 mybp) epochs. During the Oligocene and Miocene, the Bozeman Group of sedimentary formations was deposited in the intermountain valleys. The Bozeman Group consists of the Renova Formation and the overlying Sixmile Creek Formation. The Renova Formation consists of a thick sequence of fine-grained, low energy, fluvial sediments that include freshwater limestone, mudstone, siltstone, and some conglomerate. The late Miocene Sixmile Creek Formation is composed of fine- to coarse-grained, volcanoclastic, fluvial sandstone, and conglomerate. The change in sediment texture from the Renova Formation to the Sixmile Creek Formation shows a change from low-energy depositional environments in the Oligocene to higher energy depositional environments in the late Miocene. Typical soils associated with these deposits are the Amesha, Cabba, Cabbart, Headwaters, and Udecide series.

The Huckleberry Ridge Tuff Volcanics, deposited during the late Pliocene, form resistant plateaus that overlie shales and sandstones along the West Fork of the West Gallatin River. These areas are prone to slumping and landslides, especially around springs and seeps. Soils found in these volcanics include the Arcette, Cowood, Lonniebee, and Ouselfal series.

The Quaternary Period is divided into the Pleistocene (1.8 my to 10,000 years before present) and the Holocene (10,000 years to present) epochs. Local volcanism and the deposition of extensive gravel outwash, which now form gravel terraces, characterized the early Quaternary Period. Soils found in gravel terraces include the Amesha, Anceny, Trimad, and Windham series.

Extensive glaciation took place during several intervals within the Pleistocene Epoch. Glacial deposits from the Bull Lake and older periods of glaciation consist of poorly sorted and highly weathered till and outwash. Glacial deposits from the more recent Pinedale glacial period consist of less weathered till and outwash. Lacustrine sediments

found in the Gallatin Canyon were formed in lakes, possibly created by ice dams or landslides during both glacial periods. Soils formed in glacial till and outwash include the Bridger, Libeg, Loberg, and Stemple series.

Toward the end of the Pleistocene, a drier climate prevailed and much of the glacial outwash was reworked and deposited as loess. This loess mantles much of the valley today in deposits of varying thickness.

The Holocene Epoch has been typified by incision into Pleistocene mountain front deposits, with some flood plain deposition in the basins. Colluvium has also been deposited on steep mountain slopes throughout the Holocene. This process of erosion and deposition continues today.

Many of the important agricultural soils in the Gallatin Valley are formed in calcareous loess. Soils formed in loess include the Amsterdam, Bigbear, Blackdog, Brocko, Danvers, Kelstrup, and Quagle series. Some soils formed in recent alluvium are the Attewan, Beaverell, Beaverton, Beavwan, Chinook, Hyalite, Kalsted, and Turner series.

Mineral Resources

Early in its history, Gallatin County had short periods of intense mining activity. At present, there is very little active mining of minerals in the survey area. Production of cement from limestone quarried at Trident, along the Missouri River, is the largest mining operation in the survey area. As of 1992, the mine employed 100 people with an annual payroll of 3-million dollars.

Placer mining for gold occurred sporadically in the Gallatin Canyon from 1900 to 1945, mainly in Taylor Creek (locally known as Taylor's Fork) and the West Fork of the Gallatin River. In 1916, the Gallatin River Canyon was surveyed as possible dredge ground. The reports were optimistic and declared it another Alder Gulch. The area, however, never yielded gold ore to meet these expectations.

The northern end of the Madison Range, including parts of the Gallatin Canyon, contains deposits of asbestos, corundum, and kyanite. Some asbestos mining took place at the Karst Mine near Asbestos Creek, a tributary of the West Gallatin River, during the early to mid-1900s. Discovered in 1903 by Pete Karst, the mine yielded 1,800 tons of ore by 1938. Additional prospects, located on Table Mountain, were apparently never worked.

Hard-rock mining and exploration has been very limited in Gallatin County. Lead-zinc prospects are found in Hyalite Canyon and in the northern part of

the Bridger Range along Pass Creek and Johnson Creek. The September Morn, a lead-silver mine in the Pass Creek area, produced 37 tons of ore from 1939 to 1940 but has since been abandoned.

Seams of coal found in Cretaceous sediments have been mined in the Bozeman Pass area in both Gallatin and Park counties. The mining area was divided into Trail Creek Field and the Cokedale, Timberline, Meadowcreek, and Chestnut districts. The Timberline District opened in 1883 and produced 300 tons per day until 1895. Most of the mines were abandoned by the early 1900s. Generally, the deposits are high-grade bituminous coal that were processed locally and used to supply the Northern Pacific Railway and the Washoe Coal and Copper Company with steam engine fuel. Ruins of the coke ovens and mine workings are still visible today south of Interstate 90 along the Bozeman Pass.

The Belgrade area contains an abundance of sand and gravel deposits, which are used for aggregate in the construction industry. Hard rock quarry sites located throughout the county produce rock for building materials, railroad ballast, and riprap for stream erosion control.

Ground Water Resources

Most of the water for irrigation and domestic use in the Gallatin Valley comes from surface water sources. These sources are available during the growing season for a limited time, depending on the duration and amount of precipitation. The city of Bozeman relies on treated surface water for domestic use and for irrigation of parks and university grounds. Treatment of surface water is expensive and the supply is often insufficient to meet the demand during dry periods. This situation has generated interest in further development of ground water for both municipal and agricultural uses.

The principal aquifer systems are composed of Quaternary sediments that overlie older Tertiary deposits. Two of the more important aquifers are the Bozeman Fan and the Belgrade basin. The Bozeman Fan is apparently a true alluvial fan only near its source above the 5,080-foot (1,550-m) contour line. Below this line, the toe of the fan is probably an older surface eroded into Tertiary basin-fill (Custer, 1991). Tertiary-age sediments typically have lower yields but are a very important source of ground water for home sites along the western slope of the Bridger Range, the Gallatin Front, Sourdough Ridge, Gooch Hill, and the Camp Creek Hills. These areas have limited and

very deep water wells and may experience problems with water availability as development continues.

Recharge of these aquifers is primarily by infiltration from stream and irrigation water and also by precipitation and snowmelt. Extensive diversion and transport of surface water has created large areas in the valley where depth to ground water is less than 10 feet (3 m) from the surface. Alluvial fans thinning above impermeable layers or where streams and drains intersect the water table are areas where ground water is discharged at the surface. Ground water discharge at the surface commonly occurs to the north and west of Belgrade and along the distal edge of the Bozeman Fan at the 5,080-foot contour.

Considerable development of home sites has taken place recently on the Bozeman Fan. This formation consists of a thick sequence of gravel, cobbles, and sand over a relatively impermeable layer of Tertiary sediments. Over much of the fan, ground water is less than 10 feet and may be as shallow as 3 to 5 feet below the surface. The potential for contamination from domestic septic systems is high in this area, especially in older shallow wells. Soils formed in flood plain areas or having high water tables include the Enbar, Fairway, Lamoose, Meadowcreek, Rivra, Ryell, and Tetonview series.

Well use, current to December, 1993, for Gallatin County is summarized below. This information was provided by the Montana Ground Water Information Center in Butte, Montana. Often wells have multiple uses and are listed under both domestic and stockwater supplies, so the total appears to be less than the sum of the uses.

TOTAL WELLS	7,363
Domestic	6,140
Stockwater	1,118
Irrigation	372
Commercial	112
Monitoring	98
Public Water Supply	83
Industrial	64
Other	32
Institutional	24
Fire Protection	7
Research	2
Abandoned	1

Seismic Activity

Gallatin County is located within the northern Rocky Mountain Seismic Belt, which trends northwestward through western Montana. This belt is

characterized by shallow seismicity, earthquake swarms, and normal fault scarps with evidence of recent movement. Areas of current seismic activity include Hebgen Lake, Three Forks, and the Clarkstone Valley. Hebgen Lake is the most seismically active zone in the lower 48 states outside of California. The 1959 earthquake at Hebgen Lake rated 7.5 on the Richter Scale, which resulted in the death of several nearby campers and created Quake Lake in Madison County. In 1929, there was a 6.8 Richter-magnitude earthquake centered in the Clarkston Valley, north of Logan. This earthquake damaged buildings in Logan and Three Forks and as far away as White Sulphur Springs. The area within 10 km of Three Forks has consistently produced quakes over the last decade in the 3.5 to 3.9 range (Michael Stickney, personal communication). This ongoing seismic activity implies that Basin-and-Range type extensional forces are still at work in southwestern Montana.

Climate

Summertime in Gallatin County is generally pleasant, with cool nights; moderately warm, sunny days; and slight to moderate breezes. Most rainfall is in the form of showers or thunderstorms and usually occurs in the late spring or early summer months. Most summers pass with the highest temperatures failing to reach 100 degrees, and an average year will have only 15 days with maximums of 90 degrees or higher. Weather stations at Belgrade Airport, Montana State University, and the Arthur Post Research Farm show freezing does not occur in July, rarely in mid-June or August, and more often in May and September. However, on rare occasions frost may occur in low-lying areas at any time of the year.

The severity of winter weather varies widely within the county. Low elevation areas in the western part of

the county receive less snow, and temperatures are milder than the higher elevation foothills and mountains surrounding Bozeman. Subzero cold waves are common in the winter, and these periods may last for several days.

The "Temperature and Precipitation" table gives data on temperature and precipitation for Gallatin County. The "Freeze Dates in Spring and Fall" table gives probable dates of the first and last freezing periods in the spring and fall. The "Growing Season" table provides data on the length of the growing season.

Differences in the amount of precipitation are considerable within Gallatin County. The wettest areas are located in the mountains, foothills, and high valleys near Bozeman where total snowfall may range from 50 to over 200 inches per year. Rain usually falls in the spring and early summer months. Hail is observed occasionally during summer rain squalls and thunderstorms.

Although the average annual precipitation is low enough to classify most of the area as semi-arid, it is important to note that about 70 percent of the annual total precipitation normally falls during the April to September growing season. It is for this reason that Gallatin County is one of the most productive small-grain growing regions of Montana. The combination of ideal temperatures during the growing season, long hours of summer sunshine, and 7 to 10 inches of precipitation from May through September make the climate favorable for dryland farming. Heavy fog seldom occurs and is limited to about one or two days per month, lasting only a small part of the day. Although the area does receive slight to moderate average wind speeds, strong or extremely strong winds of over 70 mph are not commonly observed. Normal visibility is excellent.

Temperature and Precipitation

(Recorded in the period 1961-1995 at Belgrade Airport, MT; Bozeman 12 NE, MT; Bozeman 6 W Experiment Farm, MT; Bozeman Montana State University (MSU), MT; Hebgen Dam, MT; and West Yellowstone, MT.)

	Temperature (Degrees F)					Precipitation (Inches)					
Month	Average Daily Maximum	Average Daily Minimum	Average	2 Years in 10 Will Have—		Average Number of Growing Degree Days*	Average	2 years in 10 Will Have—		Average Number of Days With 0.10 or More	Average Total Snowfall
				Maximum Temperature More Than	Minimum Temperature Less Than			Less Than	More Than		
BELGRADE AIRPORT:											
January-----	29.3	6.4	17.9	54	-34	2	0.61	0.25	0.92	1	7.4
February-----	35.8	13.2	24.5	59	-27	6	0.48	0.22	0.70	1	4.7
March-----	43.1	19.7	31.4	69	-16	30	1.06	0.57	1.49	3	8.4
April-----	54.4	28.9	41.6	80	8	126	1.35	0.72	1.92	4	6.3
May-----	64.4	37.4	50.9	86	22	346	2.44	1.53	3.25	6	2.3
June-----	74.0	44.5	59.3	94	31	576	2.49	1.24	3.57	6	0.1
July-----	83.9	49.2	66.6	98	35	823	1.22	0.38	1.91	3	0.0
August-----	82.8	47.9	65.3	99	33	786	1.23	0.61	1.76	3	0.0
September---	70.1	38.8	54.5	92	22	440	1.46	0.62	2.26	4	0.5
October-----	58.2	29.3	43.8	82	8	177	1.19	0.49	1.78	3	2.2
November----	41.0	17.9	29.4	66	-16	25	0.83	0.44	1.17	3	5.8
December----	31.0	8.1	19.6	56	-30	5	0.57	0.28	0.81	2	6.7
Yearly:											
Average---	55.7	28.4	42.1	—	—	—	—	—	—	—	—
Extreme---	103.0	-46.0	—	101	-38	—	—	—	—	—	—
Total-----	—	—	—	—	—	3,343	14.93	12.00	17.22	39	44.3
BOZEMAN 12 NE:											
January-----	32.3	8.2	20.3	54	-34	3	2.66	1.60	3.61	7	38.1
February-----	36.4	11.2	23.8	56	-31	4	1.92	1.16	2.61	6	28.0
March-----	40.9	15.0	27.9	62	-22	9	2.63	1.62	3.55	7	38.1
April-----	48.6	22.9	35.7	71	-3	42	3.47	2.23	4.59	9	30.7
May-----	58.1	30.4	44.3	78	13	168	4.46	3.26	5.57	10	11.6
June-----	66.8	36.7	51.7	84	24	355	4.41	2.79	5.87	9	1.4
July-----	75.0	39.7	57.3	88	28	536	2.27	0.91	3.42	5	0.1
August-----	74.8	38.2	56.5	89	27	511	2.47	1.18	3.59	5	0.3
September---	64.0	32.0	48.0	84	13	262	3.05	1.14	4.63	6	3.7
October-----	54.0	25.9	40.0	75	-1	106	2.77	1.38	3.99	6	13.2
November----	39.6	16.7	28.1	62	-16	12	2.77	1.75	3.69	7	28.2
December----	32.9	9.2	21.1	54	-30	4	2.38	1.45	3.22	8	34.8
Yearly:											
Average---	51.9	23.8	37.9	—	—	—	—	—	—	—	—
Extreme---	95.0	-47.0	—	90	-40	—	—	—	—	—	—
Total-----	—	—	—	—	—	2,013	35.26	30.31	39.88	85	228.2

See footnote at end of table.

Temperature and Precipitation--Continued

	Temperature (Degrees F)					Precipitation (Inches)					
Month	Average Daily Maximum	Average Daily Minimum	Average	2 Years in 10 Will Have—		Average Number of Growing Degree Days*	Average	2 years in 10 Will Have—		Average Number of Days With 0.10 or More	Average Total Snowfall
				Maximum Temperature More Than	Minimum Temperature Less Than			Less Than	More Than		
BOZEMAN 6 W EXPERIMENT FARM:											
January----	32.8	11.6	22.2	55	-26	5	0.56	0.29	0.80	1	9.8
February----	38.0	16.3	27.2	58	-21	9	0.48	0.23	0.72	1	7.2
March-----	45.3	22.4	33.8	67	-9	39	1.13	0.66	1.54	3	12.8
April-----	55.0	29.7	42.4	78	7	146	1.63	0.95	2.25	5	9.6
May-----	64.6	37.6	51.1	84	22	353	2.77	1.76	3.69	7	1.7
June-----	73.3	44.2	58.7	91	31	563	2.74	1.54	3.81	7	0.2
July-----	80.9	48.6	64.7	93	35	768	1.57	0.68	2.32	4	0.0
August-----	80.9	47.3	64.1	94	34	748	1.35	0.73	1.91	3	0.1
September---	70.4	39.6	55.0	90	22	455	1.64	0.65	2.47	4	0.5
October----	58.0	31.1	44.6	79	7	200	1.46	0.79	2.06	4	4.3
November----	41.7	20.6	31.1	66	-13	31	0.92	0.52	1.27	3	9.3
December----	33.6	12.4	23.0	57	-22	8	0.58	0.28	0.84	1	9.6
Yearly:											
Average---	56.2	30.1	43.2	—	—	—	—	—	—	—	—
Extreme---	100.0	-39.0	—	95	-31	—	—	—	—	—	—
Total----	—	—	—	—	—	3,324	16.85	14.63	18.87	43	64.9
BOZEMAN MSU:											
January----	33.1	13.3	23.2	55	-21	5	0.86	0.45	1.23	2	13.3
February----	38.5	18.3	28.4	58	-16	10	0.64	0.31	0.93	2	9.8
March-----	44.8	23.2	34.0	67	-6	43	1.42	0.83	1.94	4	17.4
April-----	54.8	30.9	42.8	77	11	155	2.01	1.27	2.67	5	14.1
May-----	64.3	39.3	51.8	83	24	375	3.17	2.08	4.16	7	4.6
June-----	73.4	46.4	59.9	91	32	598	2.94	1.65	4.08	7	0.3
July-----	81.9	51.9	66.9	94	38	834	1.52	0.66	2.26	4	0.0
August-----	81.3	50.5	65.9	94	36	802	1.50	0.78	2.13	4	0.1
September---	70.0	41.6	55.8	89	23	481	1.88	0.70	2.86	4	1.2
October-----	59.1	33.2	46.2	80	11	239	1.65	0.85	2.35	4	5.6
November----	42.3	22.7	32.5	65	-7	37	1.20	0.65	1.68	3	12.1
December----	34.2	14.9	24.6	56	-19	8	0.73	0.40	1.02	2	11.9
Yearly:											
Average---	56.5	32.2	44.3	—	—	—	—	—	—	—	—
Extreme---	99.0	-32.0	—	95	-26	—	—	—	—	—	—
Total----	—	—	—	—	—	3,586	19.51	16.80	21.91	48	90.4

See footnote at end of table.

Temperature and Precipitation--Continued

	Temperature (Degrees F)					Precipitation (Inches)					
Month	Average Daily Maximum	Average Daily Minimum	Average	2 Years in 10 Will Have—		Average Number of Growing Degree Days*	Average	2 years in 10 Will Have—		Average Number of Days With 0.10 or More	Average Total Snowfall
				Maximum Temperature More Than	Minimum Temperature Less Than			Less Than	More Than		
HEBGEN DAM:											
January----	21.4	1.9	11.6	39	-37	0	3.20	1.88	4.39	11	46.3
February----	28.0	5.1	16.5	44	-32	0	2.43	1.47	3.29	8	34.1
March-----	36.5	11.7	24.1	53	-25	0	2.64	1.25	3.83	8	31.0
April-----	46.5	22.2	34.4	67	-3	29	1.98	0.85	2.93	5	11.4
May-----	59.1	31.5	45.3	78	15	188	2.72	1.86	3.51	7	3.0
June-----	68.7	38.6	53.6	85	27	403	3.31	1.91	4.55	8	0.5
July-----	78.0	43.5	60.7	89	32	627	1.94	1.08	2.70	5	0.0
August-----	77.0	42.4	59.7	88	31	595	1.92	0.73	2.92	5	0.0
September---	66.4	35.4	50.9	83	15	326	2.01	0.80	3.14	5	0.4
October-----	52.2	27.7	39.9	72	7	92	1.71	0.58	2.63	4	5.0
November----	33.2	17.4	25.3	54	-10	2	2.77	1.64	3.77	8	29.9
December----	22.2	4.4	13.3	40	-30	0	3.32	1.91	4.57	10	48.2
Yearly:											
Average---	49.1	23.5	36.3	—	—	—	—	—	—	—	—
Extreme---	92.0	-45.0	—	89	-39	—	—	—	—	—	—
Total-----	—	—	—	—	—	2,263	29.94	25.00	34.32	84	209.8
WEST YELLOWSTONE:											
January----	23.8	0.7	12.2	41	-43	0	2.13	0.96	3.14	7	32.1
February----	30.6	3.9	17.2	47	-36	0	1.66	0.92	2.31	5	25.3
March-----	37.7	10.6	24.1	56	-26	1	1.69	0.85	2.42	5	22.1
April-----	46.3	20.4	33.3	68	-6	20	1.68	0.85	2.40	5	12.9
May-----	58.5	29.5	44.0	80	13	165	2.04	1.32	2.69	6	3.3
June-----	68.4	36.7	52.5	87	24	380	2.45	1.45	3.34	7	0.3
July-----	78.0	41.0	59.5	90	28	606	1.75	0.88	2.51	5	0.0
August-----	76.4	38.9	57.7	90	25	547	1.51	0.53	2.32	4	0.0
September---	65.2	30.5	47.8	84	12	256	1.70	0.54	2.64	4	0.8
October-----	51.6	22.4	37.0	73	-2	54	1.41	0.53	2.22	3	7.8
November----	33.5	12.0	22.7	55	-24	1	2.10	0.98	3.07	6	27.1
December----	23.6	1.5	12.6	41	-38	0	2.37	1.10	3.45	7	35.2
Yearly:											
Average---	49.5	20.7	35.1	—	—	—	—	—	—	—	—
Extreme---	96.0	-60.0	—	92	-47	—	—	—	—	—	—
Total-----	—	—	—	—	—	2,031	22.47	16.94	25.56	64	166.8

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold: 40.0 degrees F).

Freeze Dates in Spring and Fall

(Recorded in the period 1961-1995 at Belgrade Airport, MT; Bozeman 12 NE, MT; Bozeman 6 W Experiment Farm, MT; Bozeman Montana State University (MSU), MT; Hebgen Dam, MT; and West Yellowstone, MT.)

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
BELGRADE AIRPORT:			
Last freezing temperature in spring: January-July			
1 year in 10 later than----	May 16	May 24	June 27
2 years in 10 later than----	May 10	May 19	June 19
5 years in 10 later than----	April 29	May 9	June 3
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 16	September 5	August 28
2 years in 10 earlier than--	September 22	September 11	September 2
5 years in 10 earlier than--	October 3	September 21	September 12
BOZEMAN 12 NE:			
Last freezing temperature in spring: January-July			
1 year in 10 later than----	June 4	July 9	July 31
2 years in 10 later than----	May 29	July 1	July 25
5 years in 10 later than----	May 18	June 17	July 13
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 3	August 16	July 31
2 years in 10 earlier than--	September 7	August 23	August 6
5 years in 10 earlier than--	September 17	September 3	August 15

Freeze Dates in Spring and Fall--Continued

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
BOZEMAN 6 W EXPERIMENT FARM:			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	May 9	May 24	June 24
2 years in 10 later than----	May 5	May 18	June 17
5 years in 10 later than----	April 26	May 7	June 4
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 16	September 7	August 31
2 years in 10 earlier than--	September 22	September 12	September 4
5 years in 10 earlier than--	October 4	September 22	September 12
BOZEMAN MSU:			
Last freezing temperature in spring: January-July			
1 year in 10 later than-----	May 10	May 18	June 12
2 years in 10 later than----	May 4	May 13	June 6
5 years in 10 later than----	April 24	May 4	May 25
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 26	September 13	September 1
2 years in 10 earlier than--	October 1	September 19	September 7
5 years in 10 earlier than--	October 12	October 1	September 17

Freeze Dates in Spring and Fall--Continued

Probability	Temperature		
	24 degrees F or lower	28 degrees F or lower	32 degrees F or lower
HEBGEN DAM:			
Last freezing temperature in spring: January-July			
1 year in 10 later than----	May 27	June 17	July 4
2 years in 10 later than---	May 21	June 10	June 29
5 years in 10 later than---	May 11	May 29	June 20
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	September 12	September 3	August 13
2 years in 10 earlier than--	September 17	September 7	August 19
5 years in 10 earlier than--	September 28	September 15	September 1
WEST YELLOWSTONE:			
Last freezing temperature in spring: January-July			
1 year in 10 later than----	June 12	July 11	July 22
2 years in 10 later than---	June 6	July 4	July 16
5 years in 10 later than---	May 25	June 20	July 6
First freezing temperature in fall: August-December			
1 year in 10 earlier than---	August 30	August 13	August 2
2 years in 10 earlier than--	September 4	August 18	August 8
5 years in 10 earlier than--	September 12	August 28	August 18

Growing Season

(Recorded in the period 1961-1995 at Belgrade Airport, MT; Bozeman 12 NE, MT; Bozeman 6 W Experiment Farm, MT; Bozeman Montana State University (MSU), MT; Hebgen Dam, MT; and West Yellowstone, MT)

Probability	Daily Minimum Temperature		
	Higher than 24 degrees F	Higher than 28 degrees F	Higher than 32 degrees F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
BELGRADE AIRPORT:			
9 years in 10-----	131	111	69
8 years in 10-----	140	119	80
5 years in 10-----	157	134	100
2 years in 10-----	173	149	120
1 year in 10-----	182	157	130
BOZEMAN 12 NE:			
9 years in 10-----	98	45	5
8 years in 10-----	106	56	15
5 years in 10-----	121	77	32
2 years in 10-----	135	99	50
1 year in 10-----	143	110	59
BOZEMAN 6 W EXPERIMENT FARM:			
9 years in 10-----	134	113	78
8 years in 10-----	143	122	86
5 years in 10-----	160	137	99
2 years in 10-----	177	153	113
1 year in 10-----	186	161	120

Growing Season--Continued

Probability	Daily Minimum Temperature		
	Higher than 24 degrees F	Higher than 28 degrees F	Higher than 32 degrees F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
BOZEMAN MSU:			
9 years in 10-----	146	125	88
8 years in 10-----	154	133	97
5 years in 10-----	171	149	114
2 years in 10-----	187	165	132
1 year in 10-----	196	174	141
HEBGEN DAM:			
9 years in 10-----	114	86	48
8 years in 10-----	123	93	56
5 years in 10-----	139	107	72
2 years in 10-----	156	121	88
1 year in 10-----	164	129	96
WEST YELLOWSTONE:			
9 years in 10-----	88	44	18
8 years in 10-----	95	52	26
5 years in 10-----	110	69	42
2 years in 10-----	125	85	57
1 year in 10-----	133	94	65

Formation and Classification of the Soils

This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification. The "Classification of the Soils" table at the end of this section shows the classification and extent of the soils in this survey area.

Formation of the Soils

Soil is a natural, three-dimensional body on the earth's surface. Soil has properties that result from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over a period of time.

Although there are many different soils, each soil is the result of the interaction of the same five factors. These factors are the physical and chemical composition of the parent material, the effect of climate on the parent material, the kinds of plants and organisms living in the soil, the relief of the land, and the length of time it took for the soil to form.

Within short distances, the combination of these factors varies, and, consequently, the soils that form differ in fertility, productivity, and physical and chemical characteristics. In the following paragraphs, the factors of soil formation are discussed as they relate to the soils in the Gallatin County Area.

Climate

Temperature and precipitation mainly determine climate, an active force in the formation of soils. In the Gallatin County Area, winters are cold; springs are cool and moist; and summers are hot and dry. Soils form in rocks that have been broken into suitable materials by erosion and alternate freezing and thawing. Chemical reactions, such as solution and hydration, further break down this weathered material.

Precipitation and temperature affect the kind and amount of vegetation that grows on the soil. Vegetation decays to produce organic matter in the soil. Soils that have cool temperatures and high precipitation generally contain more organic matter

and are dark colored. Soils that have warm temperatures and low precipitation generally contain less organic matter and are light colored.

In the west-central part of the survey area, the average annual precipitation ranges from 10 to 14 inches within elevations of approximately 3,900 to 4,800 feet. Precipitation from 15 to 19 inches occurs in other parts of the county where elevations are 4,700 to 6,000 feet, and 20 to 30 inches of precipitation occurs above 6,000 feet. The average annual temperature ranges from 32 to 45 degrees. The lower temperatures are in areas above 6,000 feet, and the higher temperatures are in areas below this elevation.

Living Organisms

Living organisms are active in the formation of soils. Plants, animals, insects, and microorganisms affect gains or losses in organic matter, plant nutrients in the soil, and changes in porosity and structure.

Roots, rodents, and insects penetrate the soil and alter its structure. Microorganisms, chemicals in the soil, and insects change leaves, roots, and entire plants that remain in the surface layer to humus. Fungi and algae also contribute to the decomposition of bedrock. Animals increase porosity by burrowing through the soil and leaving open channels for the movement of water and air. Common rodents in the survey area are badgers, ground squirrels, mice, rabbits, and voles.

Vegetation in the survey area consists mainly of short grasses, mid grasses, and shrubs on the rangeland and Douglas-fir, Engelmann spruce, lodgepole pine, and subalpine fir with shrub understories in the forests.

Topography

Topography, or relief, is determined by glaciation and mountain formation and by the age and resistance of geologic formations to erosion by wind and water. Topography influences soil development

through its effect on drainage and runoff. Topography in this survey area can be distinctively separated into mountains and intermountain valleys. The mountains rise 3,000 to 4,000 feet above the valleys and are moderately steep to very steep with numerous drainageways. The intermontane valleys are nearly level to gently sloping with occasional areas of steep hills.

The topography of the Gallatin County Area closely affects the local climate. The amount of precipitation and air temperatures can have wide variations within short distances.

In the mountains, generally, steepness and shape of slope affect depth to bedrock, amount of rock fragments, and number and distinctness of soil horizons. Soils on steep convex slopes generally have a greater amount of rock fragments, are shallower to bedrock, and have fewer and less distinct soil horizons. Examples of this general principle are the Cowood soils on very steep slopes and the Danaher soils that are moderately sloping.

In the valleys, the number and distinctness of soil horizons generally decrease as slope increases. Examples of this general principle are the Anceny soils that are steep and very steep and the Blackdog soils that are nearly level to strongly sloping.

Parent Material

Soils have formed in a number of parent materials in the Gallatin County Area. Most of the soils in the valleys formed in mixed alluvium or loess. The mountains and bedrock-controlled hills may have soils formed in one of the following parent materials: limestone, gneiss and schist, quartzite, argillite, sandstone, shale, or igneous volcanics.

A single parent material under the influence of varying precipitation amounts exhibits marked changes in soil development. Generally silty soils that formed in loess, such as Blackmore and Brocko soils, are examples of this principle. Other examples are generally loamy and high in rock fragment-content soils that formed in limestone, such as Crago and Hanson. Generally sandy soils formed in gneiss and schist, such as Barbarela and Nuley soils, and generally clayey soils are found in shale, such as Bangtail and Tanna soils.

Many of the soils in the survey area have accumulated lime from the parent material. The presence, depth, and amount of lime vary with parent materials and amount of precipitation in the specific area.

Time

Change taking place in soils over a long period of time is called soil genesis. As a result of these changes, distinct horizons, or layers, develop in the soils. The length of time that parent materials have been in place and exposed to climate and living organisms is generally reflected in the degree to which the soil profile has developed. The kind and arrangement of layers are called the soil morphology. These layers are described in terms of color, texture, structure, consistence, thickness, permeability, and chemistry.

Soils are classified according to their approximate age, from young to mature. Age, or maturity, of a soil is generally indicated by the thickness and distinctness of subsurface horizons, content of organic matter and clay, depth to which soluble material is leached, and form and distribution of calcium carbonate and gypsum in the soil.

Young soils show very little profile development. Ryell sandy loam, a soil of the Entisol order, is an example of a young soil. It is on a flood plain adjacent to a flowing stream. The soil contains little organic matter to form an A horizon; it has little clay accumulation and little translocation of carbonates within the profile.

The Turner soil formed in parent material that is similar to that of the Ryell sandy loam but is much older. These soils formed in alluvium on uplands. They contain enough organic matter to have a dark-colored A horizon, a distinct clay accumulation in a Bt horizon, and nearly all of the carbonates have been leached to a depth of about 12 inches.

Many of the sloping and steep, shallow, and very shallow soils appear to have been in the process of formation for about as long as some of the more developed, less sloping soils. However, erosion has removed the soil as fast as it formed. In this case, the effect of time has been offset by the effect of relief.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The table, "Classification

of the Soils,” shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol, from *mollis*, meaning soft.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (Ust, meaning burnt, plus oll, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiustoll (*Argi*, meaning having an argillic horizon or clay accumulation, plus *ustoll*, the suborder of the Mollisols that have a dry climate).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other

orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Argiustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, superactive Argiustolls.

SERIES. The series consists of soils within a family that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series. An example is the Blackdog series. The Blackdog series is a fine-silty, mixed, superactive, frigid Typic Argiustoll.

Soil Series and Detailed Map Units

In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each description is followed by the detailed soil map units associated with the series.

Characteristics of the soil and the material in which it formed are identified for each soil series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class, there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They

may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and, consequently, they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all of the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all of the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The

name of a soil phase commonly indicates a feature that affects use or management. For example, very stony loam is a phase of the Sawicki series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

This survey includes *complexes*. They consist of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Amsterdam-Quagle silt loams, 0 to 4 percent slopes, is an example.

This survey includes *miscellaneous areas*. They have little or no soil material and support little or no vegetation. Rock outcrop is an example.

The table, "Acreage and Proportionate Extent of the Soils," in Part II of the manuscript gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils or miscellaneous areas.

Abor Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Very slow

Landform: Hills

Parent material: Semiconsolidated, clayey sedimentary beds

Slope range: 2 to 45 percent

Elevation range: 4,150 to 5,300 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Fine, smectitic, frigid Aridic Leptic Haplusterts

Typical Pedon

Abor cobbly clay loam in an area of Abor-Rock outcrop complex, 15 to 45 percent slopes, in an area of rangeland, 2,000 feet north and 600 feet east of the southwest corner of sec. 12, T. 1 N., R. 1 E.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) cobbly clay loam, grayish brown (2.5Y 5/2) moist; weak medium granular structure; hard, firm, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; 15 percent cobbles and

5 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

Bss—3 to 12 inches; light gray (2.5Y 7/2) silty clay, light brownish gray (2.5Y 6/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, very sticky, and very plastic; many very fine and fine roots; few slickensides; slightly effervescent; moderately alkaline; clear smooth boundary.

Bky—12 to 25 inches; light gray (5Y 7/2) silty clay, pale olive (5Y 6/3) moist; moderate medium subangular blocky structure; very hard, firm, very sticky, and very plastic; few very fine roots; common fine masses of lime and gypsum; strongly effervescent; moderately alkaline; clear wavy boundary.

Cr—25 to 60 inches; semiconsolidated siltstone and shale.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bky horizon: 10 to 18 inches

Depth to the Cr horizon: 20 to 40 inches

Note: These soils have cracks extending to over 50 cm deep and 1 to 5 cm wide.

A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 1, 2, 3, or 4 (chromas of 1 derived from parent material)

Clay content: 35 to 40 percent

Content of rock fragments: 15 to 35 percent—10 to 20 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 7.4 to 9.0

Bss horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 1, 2, 3, or 4

Texture: Silty clay, silty clay loam, or clay

Clay content: 35 to 60 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 7.4 to 9.0

Bky horizon

Hue: 2.5Y, 5Y, 10YR, or 2.5YR

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 1, 2, 3, or 4

Texture: Silty clay, silty clay loam, or clay

Clay content: 35 to 60 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 8
 Calcium carbonate equivalent: 5 to 15 percent
 Gypsum content: 1 to 5 percent
 Reaction: pH 7.4 to 9.0

721E—Abor-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Abor—Hills
- Rock outcrop—Hills

Slope: 15 to 45 percent

Elevation: 4,150 to 4,500 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Abor and similar soils: 55 percent

Rock outcrop: 35 percent

Minor Components

Patouza clay: 0 to 5 percent

Soils less than 20 inches to shale: 0 to 5 percent

Major Component Description

Abor

Surface layer texture: Cobbly clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, clayey sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.7 inches

Rock outcrop

Definition: Exposures of clayey sedimentary bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Absarokee Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Sedimentary plains and hills

Parent material: Interbedded sandstone and shale residuum

Slope range: 4 to 45 percent

Elevation range: 4,650 to 6,150 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine, smectitic, frigid Typic Argiustolls

Typical Pedon

Absarokee clay loam in an area of Farnuf-Absarokee complex, 4 to 8 percent slopes, in an area of hayland, 400 feet south and 950 feet west of the northeast corner of sec. 21, T. 3 N., R. 4 E.

Ap—0 to 5 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and fine roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt—5 to 17 inches; brown (10YR 5/3) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common fine pores; 5 percent pebbles; neutral; clear wavy boundary.

Bk—17 to 25 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; few very fine roots; many fine pores; common fine masses of lime; strongly effervescent; slightly alkaline; clear wavy boundary.

R—25 inches; interbedded hard shale and sandstone.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 12 inches

Depth to bedrock: 20 to 40 inches

Depth to the Bk horizon: 12 to 30 inches

Ap horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles or channers

Reaction: pH 6.6 to 7.3

Bt horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, clay, or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles or channers

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

869D—Absarokee-Tolbert complex, 4 to 15 percent slopes

Setting

Landform:

- Absarokee—Hills
- Tolbert—Hills

Slope:

- Absarokee—4 to 15 percent
- Tolbert—4 to 15 percent

Elevation: 5,200 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Absarokee and similar soils: 60 percent

Tolbert and similar soils: 25 percent

Minor Components

Soils less than 10 inches deep to bedrock: 0 to 8 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Absarokee

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.7 inches

Tolbert

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

869E—Absarokee-Tolbert-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Absarokee—Hills
- Tolbert—Hills
- Rock outcrop—Hills

Slope:

- Absarokee—15 to 45 percent
- Tolbert—15 to 45 percent

Elevation: 4,950 to 6,150 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Absarokee and similar soils: 60 percent

Tolbert and similar soils: 25 percent

Rock outcrop: 10 percent

Minor Components

Soils with slopes more than 45 percent: 0 to 5 percent

Major Component Description**Absarokee**

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.7 inches

Tolbert

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

Rock outcrop

Definition: Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

769D—Absarokee-Work-Tolbert complex, 4 to 15 percent slopes**Setting**

Landform:

- Absarokee—Hills
- Work—Hills
- Tolbert—Hills

Slope:

- Absarokee—4 to 15 percent
- Work—4 to 15 percent
- Tolbert—4 to 15 percent

Elevation: 4,950 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition**Major Components**

Absarokee and similar soils: 45 percent

Work and similar soils: 35 percent

Tolbert and similar soils: 10 percent

Minor Components

Soils with slopes more than 15 percent: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Absarokee**

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.7 inches

Work

Surface layer texture: Clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.2 inches

Tolbert

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Absarook Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Sedimentary plains and hills

Parent material: Interbedded sandstone and shale residuum

Slope range: 2 to 35 percent

Elevation range: 4,400 to 6,500 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Absarook loam, in an area of Absarook-Tolbert complex, 4 to 15 percent slopes, in an area of rangeland, 2,200 feet south and 600 feet east of the northwest corner of sec. 23, T. 4 N., R. 5 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, moderately sticky, and slightly plastic; many very fine and fine roots and common medium roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt1—5 to 14 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong fine subangular blocky; hard, friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; common distinct clay films on faces of peds; 5 percent pebbles; neutral; gradual smooth boundary.

Bt2—14 to 20 inches; yellowish brown (10YR 5/4) sandy clay loam; dark yellowish brown (10YR 3/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, friable, slightly sticky, and slightly plastic; common very fine and few fine roots; common distinct clay films on faces of peds; 10 percent pebbles; neutral; abrupt wavy boundary.

Bk—20 to 32 inches; light gray (10YR 6/1) channery sandy loam, gray (10YR 5/1) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine roots; 30 percent channers; common fine

masses of lime; violently effervescent moderately alkaline; abrupt clear boundary.
R—32 inches; hard sandstone.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the Bt horizon: 4 to 6 inches

Depth to the Bk horizon: 12 to 25 inches

Depth to bedrock: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 1, 2, 3, or 4

Texture (less than 2 mm): Sandy loam, loam, or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 10 to 35 percent—0 to 5 percent cobbles; 10 to 30 percent channers

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

668D—Absarook-Farnuf-Tolbert complex, 4 to 15 percent slopes

Setting

Landform:

- Absarook—Hills
- Farnuf—Hills
- Tolbert—Hills

Slope:

- Absarook—4 to 15 percent
- Farnuf—4 to 15 percent
- Tolbert—4 to 15 percent

Elevation: 5,250 to 6,050 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Absarook and similar soils: 40 percent

Farnuf and similar soils: 35 percent

Tolbert and similar soils: 10 percent

Minor Components

Absarokee clay loam: 0 to 8 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Absarook***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.3 inches**Farnuf***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 9.0 inches**Tolbert***Surface layer texture:* Channery loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**470D—Absarook-Tolbert complex,
4 to 15 percent slopes****Setting***Landform:*

- Absarook—Hills
- Tolbert—Hills

Slope:

- Absarook—4 to 15 percent
- Tolbert—4 to 15 percent

Elevation: 4,700 to 6,200 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Absarook and similar soils: 60 percent

Tolbert and similar soils: 25 percent

Minor Components

Farnuf loam: 0 to 8 percent

Castner very flaggy loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Absarook***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.3 inches**Tolbert***Surface layer texture:* Channery loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Accola Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Mountains

Parent material: Limestone colluvium

Slope range: 15 to 45 percent

Elevation range: 4,950 to 7,600 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Ustic Argicryolls

Typical Pedon

Accola loam, in an area of Accola-Whitore, stony complex, cool, 15 to 45 percent slopes, in an area of forest land, 1,100 feet south and 400 feet east of the northwest corner of sec. 4, T. 5 N., R. 4 E.

Oi—0 to 1 inch; partially decomposed forest litter.

A—1 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine platy structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine roots and few medium roots; 5 percent pebbles; moderately acid; clear wavy boundary.

Bt1—4 to 9 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of pedis and lining pores; 5 percent pebbles; slightly acid; clear wavy boundary.

Bt2—8 to 18 inches; yellowish brown (10YR 5/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of pedis and lining pores; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bk1—18 to 29 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; weak coarse prismatic structure; soft, very friable, moderately sticky, and moderately plastic; few fine and medium roots; common distinct clay films on faces of pedis and lining pores; 15 percent cobbles and 30 percent pebbles; common fine seams of lime; violently effervescent; slightly alkaline; gradual smooth boundary.

Bk2—29 to 60 inches; very pale brown (10YR 7/4) extremely cobbly loam, light yellowish brown (10YR 6/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few fine roots; 30 percent cobbles and 35 percent pebbles; disseminated lime; common fine masses of lime; common distinct lime coatings on underside of rock fragments; violently effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 13 inches

Depth to the skeletal Bk horizon: 12 to 22 inches

A horizon

Value: 4 or 5 dry

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 5.6 to 7.3

Bt horizons

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 5.6 to 7.8

Bk horizons

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 35 to 70 percent—15 to 30 percent cobbles; 20 to 40 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.4 to 8.4

**790E—Accola-Whitore, stony complex,
15 to 45 percent slopes****Setting***Landform:*

- Accola—Mountains
- Whitore—Mountains

Slope:

- Accola—15 to 45 percent
- Whitore—15 to 45 percent

Elevation: 4,950 to 7,300 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Accola and similar soils: 60 percent

Whitore and similar soils: 30 percent

Minor Components

Soils with slopes more than 45 percent: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to
3 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Accola***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 7.0 inches**Whitore***Surface layer texture:* Gravelly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**690E—Accola-Whitore, stony complex,
cool, 15 to 45 percent slopes****Setting***Landform:*

- Accola—Mountains
- Whitore—Mountains

Slope:

- Accola—15 to 45 percent
- Whitore—15 to 45 percent

Elevation: 6,250 to 7,600 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Accola and similar soils: 60 percent

Whitore and similar soils: 35 percent

Minor ComponentsSoils less than 20 inches deep to bedrock: 0 to
4 percent

Rock outcrop: 0 to 1 percent

Major Component Description**Accola***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 7.0 inches**Whitore***Surface layer texture:* Gravelly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Limestone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Adel Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Drainageways, hills, and mountains

Parent material: Alluvium or colluvium

Slope range: 2 to 60 percent

Elevation range: 4,400 to 7,300 feet

Annual precipitation: 17 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Pachic Haplocryolls

Typical Pedon

Adel loam, cool, 4 to 15 percent slopes, in an area of forest land, 2,300 feet south and 50 feet east of the northwest corner of sec. 16, T. 5 N., R. 5 E.

A1—0 to 8 inches; very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; slightly acid; gradual wavy boundary.

A2—8 to 14 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; neutral; gradual wavy boundary.

A3—14 to 22 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; neutral; gradual wavy boundary.

Bw—22 to 60 inches; dark grayish brown (10YR 4/2) loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common fine roots; neutral.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Summer soil temperature: 52 to 59 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 16 to 60 inches

A horizons

Hue: 2.5Y or 10YR

Value: 2, 3, or 4 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

Bw horizon

Hue: 2.5Y or 10YR

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 1, 2, or 3

Texture (less than 2 mm): Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

614F—Adel loam, 15 to 60 percent slopes

Setting

Landform: Mountains

Slope: 15 to 60 percent

Elevation: 4,750 to 6,500 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Adel and similar soils: 85 percent

Minor Components

Rocky stony loam: 0 to 5 percent

Soils with slopes less than 15 percent: 0 to 5 percent

Zade loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

314C—Adel loam, 2 to 8 percent slopes

Setting

Landform: Drainageways

Slope: 2 to 8 percent

Elevation: 5,000 to 6,700 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Adel and similar soils: 85 percent

Minor Components

Libeg stony loam: 0 to 8 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Water table at 4 to 6 feet: 0 to 2 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

314E—Adel loam, 8 to 25 percent slopes

Setting

Landform: Hills

Slope: 8 to 25 percent

Elevation: 4,500 to 7,300 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Adel and similar soils: 90 percent

Minor Components

Libeg stony loam: 0 to 5 percent

Bridger loam: 0 to 2 percent

Soils with slopes more than 25 percent: 0 to 2 percent

Soils with a water table at 4 to 6 feet: 0 to 1 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

614D—Adel loam, cool, 4 to 15 percent slopes

Setting

Landform: Drainageways

Slope: 4 to 15 percent

Elevation: 5,000 to 6,550 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Adel and similar soils: 85 percent

Minor Components

Libeg loam: 0 to 5 percent

Redlodge silty clay loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

814D—Adel-Copenhaver complex, 4 to 15 percent slopes

Setting

Landform:
 • Adel—Hills
 • Copenhaver—Hills
Slope:
 • Adel—4 to 15 percent
 • Copenhaver—4 to 15 percent
Elevation: 5,400 to 6,300 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Adel and similar soils: 60 percent
 Copenhaver and similar soils: 25 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 8 percent
 Soils with slopes more than 15 percent: 0 to 5 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Adel

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.3 inches

Copenhaver

Surface layer texture: Channery loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

814E—Adel-Copenhaver complex, 15 to 35 percent slopes

Setting

Landform:
 • Adel—Hills
 • Copenhaver—Hills
Slope:
 • Adel—15 to 35 percent
 • Copenhaver—15 to 35 percent
Elevation: 5,600 to 6,300 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Adel and similar soils: 70 percent
 Copenhaver and similar soils: 20 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 5 percent
 Soils with slopes more than 35 percent: 0 to 3 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Adel

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.3 inches

Copenhaver

Surface layer texture: Channery loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

414E—Adel-Libeg complex, 15 to 35 percent slopes

Setting

Landform:

- Adel—Hills
- Libeg—Hills

Slope:

- Adel—15 to 35 percent
- Libeg—15 to 35 percent

Elevation: 5,100 to 6,900 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Adel and similar soils: 50 percent

Libeg and similar soils: 35 percent

Minor Components

Copenhaver flaggy loam: 0 to 10 percent

Libeg stony loam: 0 to 5 percent

Major Component Description

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.3 inches

Libeg

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

714E—Adel-Uinta loams, 8 to 35 percent slopes

Setting

Landform:

- Adel—Mountains
- Uinta—Mountains

Slope:

- Adel—8 to 35 percent
- Uinta—8 to 35 percent

Elevation: 5,550 to 6,700 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Adel and similar soils: 60 percent

Uinta and similar soils: 25 percent

Minor Components

Danaher stony loam: 0 to 10 percent

Stemple stony loam: 0 to 5 percent

Major Component Description

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 10.8 inches

Uinta

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 9.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Alder Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Sedimentary plains, hills, and escarpments

Parent material: Semiconsolidated, clayey sedimentary beds

Slope range: 2 to 45 percent

Elevation range: 4,800 to 6,400 feet

Annual precipitation: 18 to 22 inches

Annual air temperature: 37 to 41 degrees F

Frost-free period: 80 to 95 days

Taxonomic Class: Fine, mixed, superactive, frigid
Typic Argiustolls

Typical Pedon

Alder cobbly clay loam, in an area of Alder-Cabba complex, 8 to 25 percent slopes, in an area of cropland, 2,200 feet north and 1,700 feet west of the southeast corner of sec. 12, T. 3 S., R. 3 E.

Ap—0 to 7 inches; dark gray (10YR 4/1) cobbly clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to strong fine granular; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and few fine roots; 10 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bt—7 to 21 inches; dark gray (10YR 4/1) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; common very fine and few fine roots; many distinct clay films on faces of peds and lining pores; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bk—21 to 31 inches; light olive gray (5Y 6/2) sandy clay, olive (5Y 5/3) moist; moderate medium and coarse subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; 5 percent cobbles and 5 percent pebbles; common medium masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Cr—31 to 60 inches; variegated, weathered, semiconsolidated, tertiary sedimentary beds; fine threads of lime; neutral.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 14 inches

Depth to the Cr horizon: 20 to 40 inches

Depth to the Bk horizon: 15 to 30 inches

Ap horizon

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 35 to 40 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones; 0 to 15 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 1, 2, or 3

Texture: Clay or silty clay

Clay content: 40 to 60 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Silty clay loam, clay, or sandy clay

Clay content: 30 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

60C—Alder clay loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains

Slope: 2 to 8 percent

Elevation: 5,150 to 5,850 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Alder and similar soils: 90 percent

Minor Components

Cabba clay loam: 0 to 5 percent

Alder cobbly clay loam: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, clayey sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

360E—Alder, stony-Cabba complex, 15 to 45 percent slopes

Setting

Landform:

- Alder—Escarpments
- Cabba—Escarpments

Slope:

- Alder—15 to 45 percent
- Cabba—15 to 45 percent

Elevation: 5,000 to 6,400 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Alder and similar soils: 70 percent

Cabba and similar soils: 20 percent

Minor Components

Burnel loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Alder

Surface layer texture: Cobbly clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, clayey sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.8 inches

Cabba

Surface layer texture: Cobbly clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, clayey sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

60D—Alder-Cabba complex, 8 to 25 percent slopes

Setting

Landform:

- Alder—Hills
- Cabba—Hills

Slope:

- Alder—8 to 25 percent
- Cabba—8 to 25 percent

Elevation: 4,800 to 6,300 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Alder and similar soils: 70 percent

Cabba and similar soils: 15 percent

Minor Components

Alder stony clay loam: 0 to 5 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Danvers clay loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Alder

Surface layer texture: Cobbly clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, clayey sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.9 inches

Cabba

Surface layer texture: Cobbly clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, clayey sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Alona Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Stream terraces and alluvial fans

Parent material: Alluvium

Slope range: 0 to 4 percent

Elevation range: 3,950 to 4,900 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 43 to 45 degrees F

Frost-free period: 100 to 120 days

Taxonomic Class: Fine-silty, mixed, superactive, frigid Aridic Haplustepts

Typical Pedon

Alona silty clay loam, 0 to 4 percent slopes, in an area of cropland, 2,600 feet south and 500 feet west of the northeast corner of sec. 18, T. 3 N., R. 3 E.

A—0 to 3 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; moderately alkaline; clear smooth boundary.

Bw—3 to 11 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—11 to 16 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common fine masses of

lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bknz1—16 to 36 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; common fine masses of lime and other salts; violently effervescent; strongly alkaline; clear smooth boundary.

Bknz2—36 to 60 inches; very pale brown (10YR 7/3) silty clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common fine masses of lime and other salts; violently effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 6 to 18 inches

Depth to the Bknz horizon: 16 to 36 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 2 to 10

Reaction: pH 7.9 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Silty clay loam or silt loam

Clay content: 18 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 2 to 13

Reaction: pH 7.9 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Silty clay loam or silt loam

Clay content: 18 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 13 to 40

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Bknz horizons

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4
 Texture: Silty clay loam or silt loam
 Clay content: 18 to 35 percent
 Electrical conductivity (mmhos/cm): 8 to 16
 Sodium adsorption ratio: 13 to 40
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 8.5 to 9.0

37B—Alona silty clay loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 4 percent
Elevation: 3,950 to 4,900 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 100 to 120 days

Composition

Major Components

Alona and similar soils: 90 percent

Minor Components

Busby loam: 0 to 5 percent
 Toston loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Amesha Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Relict stream terraces, escarpments, hills, and sedimentary plains

Parent material: Alluvium or colluvium
Slope range: 0 to 60 percent
Elevation range: 4,000 to 5,600 feet
Annual precipitation: 10 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Aridic Calciustepts

Typical Pedon

Amesha loam, 4 to 8 percent slopes, in an area of cropland, 400 feet south and 960 feet west of the northeast corner of sec. 2, T. 1 S., R. 1 E.

Ap—0 to 7 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 5 percent cobbles and 5 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk1—7 to 13 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; few fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—13 to 25 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; few fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—25 to 60 inches; very pale brown (10YR 8/3) loam, light gray (10YR 7/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; 10 percent pebbles; common fine and medium masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 8 and 24 inches
Depth to the Bk horizon: 4 to 8 inches

Ap horizon

Hue: 10YR, 2.5Y, or 5Y
 Value: 5, 6, or 7 dry; 4 or 5 moist
 Chroma: 2 or 3
 Clay content: 15 to 25 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles
Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR, 2.5Y, or 5Y
Value: 6, 7, or 8 dry; 5, 6, or 7 moist
Chroma: 2 or 3
Texture: Loam, fine sandy loam, or silt loam
Clay content: 10 to 18 percent—15 to 50 percent fine and coarser sands
Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.9 to 8.4

**232C—Amesha cobbly loam,
2 to 8 percent slopes**

Setting

Landform: Relict stream terraces
Slope: 2 to 8 percent
Elevation: 4,100 to 5,300 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Amesha and similar soils: 85 percent

Minor Components

Musselshell cobbly loam: 0 to 5 percent
Soils with slopes more than 8 percent: 0 to 5 percent
Varney sandy clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

32B—Amesha loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Elevation: 4,000 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Amesha and similar soils: 85 percent

Minor Components

Amesha cobbly loam: 0 to 5 percent
Chinook fine sandy loam: 0 to 5 percent
Musselshell loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

32C—Amesha loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces
Slope: 4 to 8 percent
Elevation: 4,000 to 5,400 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Amesha and similar soils: 85 percent

Minor Components

Amesha cobbly loam: 0 to 5 percent
Musselshell loam: 0 to 5 percent

Varney sandy clay loam: 0 to 3 percent
Headwaters loam: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

32D—Amesha loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces
Slope: 8 to 15 percent
Elevation: 4,000 to 5,600 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Amesha and similar soils: 85 percent

Minor Components

Musselshell loam: 0 to 5 percent
Soils with more than 15 percent slopes: 0 to 5 percent
Trimad cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

32E—Amesha-Trimad complex, 15 to 45 percent slopes

Setting

Landform:

- Amesha—Escarpments
- Trimad—Escarpments

Slope:

- Amesha—15 to 45 percent
- Trimad—15 to 45 percent

Elevation: 4,050 to 5,250 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Amesha and similar soils: 70 percent
Trimad and similar soils: 20 percent

Minor Components

Varney sandy clay loam: 0 to 5 percent
Cabbart loam: 0 to 3 percent
Soils with an overflow range site: 0 to 2 percent

Major Component Description

Amesha

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.7 inches

Trimad

Surface layer texture: Cobbly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

32F—Amesha loam, 35 to 60 percent slopes

Setting

Landform: Escarpments

Slope: 35 to 60 percent

Elevation: 4,300 to 5,250 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Amesha and similar soils: 85 percent

Minor Components

Cabbart loam: 0 to 5 percent

Trimad cobbly loam: 0 to 5 percent

Varney sandy clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Amsterdam Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Relict stream terraces and stream terraces

Parent material: Loess

Slope range: 0 to 15 percent

Elevation range: 4,400 to 5,650 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-silty, mixed, superactive, frigid Typic Haplustolls

Typical Pedon

Amsterdam silt loam, 0 to 4 percent slopes, in an area of cropland, 500 feet north and 2,440 feet east of the southwest corner of sec. 7, T. 2 S., R. 5 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate fine and very fine granular structure; hard, very friable, slightly sticky, and slightly plastic; many fine roots; neutral; clear smooth boundary.

Bw1—8 to 10 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong fine blocky; very hard, very friable, slightly sticky, and slightly plastic; many fine roots; many fine pores; neutral; clear smooth boundary.

Bw2—10 to 15 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to weak fine and medium blocky; hard, very friable, slightly sticky, and slightly plastic; many fine roots; many fine pores; neutral; clear wavy boundary.

Bk1—15 to 20 inches; light yellowish brown (2.5Y 6/4) silt loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure; hard, very friable, slightly sticky, and slightly plastic; many fine roots; many fine pores; few fine masses of lime; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk2—20 to 28 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; moderate medium and coarse prismatic structure; hard, very friable, slightly sticky, and slightly plastic; common fine roots; many fine pores; many fine masses and threads of lime; violently effervescent; moderately alkaline; diffuse wavy boundary.

2Bk3—28 to 42 inches; pale yellow (2.5Y 7/4) very fine sandy loam, grayish brown (2.5Y 5/2) moist; weak thin platy structure; slightly hard, very friable, nonsticky, and nonplastic; few fine roots; many fine pores; common fine masses and threads of lime; violently effervescent; moderately alkaline; diffuse wavy boundary.

2C—42 to 60 inches; light yellowish brown (2.5Y 6/4) very fine sandy loam, grayish brown (2.5Y 5/2) moist; weak fine platy structure; slightly hard, very friable, nonsticky, and nonplastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the Bk horizon: 10 to 22 inches

Note: Volcanic ash influence begins at a depth of 24 to 32 inches.

A horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Reaction: pH 6.6 to 7.3

Bw1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Texture: Silt loam or silty clay loam

Clay content: 18 to 30 percent

Reaction: pH 6.6 to 7.8

Bw2 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Texture: Silt loam, silty clay loam, or very fine sandy loam

Clay content: 18 to 30 percent

Reaction: pH 6.6 to 7.8

Bk horizons and 2Bk3 horizon

Hue: 2.5Y or 10YR

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Silt loam or very fine sandy loam

Clay content: 18 to 27 percent

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 8.4

2C horizon

Hue: 2.5Y or 10YR

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Silt loam or very fine sandy loam

Clay content: 10 to 20 percent

Reaction: pH 7.9 to 8.4

53B—Amsterdam silt loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces

Slope: 0 to 4 percent

Elevation: 4,400 to 5,550 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Amsterdam and similar soils: 85 percent

Minor Components

Blackdog silty clay loam: 0 to 5 percent

Quagle silt loam: 0 to 5 percent

Bowery loam: 0 to 3 percent

Meagher cobbly loam: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

53C—Amsterdam silt loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces

Slope: 4 to 8 percent

Elevation: 4,450 to 5,600 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Amsterdam and similar soils: 85 percent

Minor Components

Blackdog silty clay loam: 0 to 5 percent

Quagle silt loam: 0 to 5 percent

Bowery loam: 0 to 3 percent

Meagher cobbly loam: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

453B—Amsterdam-Quagle silt loams, 0 to 4 percent slopes

Setting

Landform:

- Amsterdam—Relict stream terraces
- Quagle—Relict stream terraces

Slope:

- Amsterdam—0 to 4 percent
- Quagle—0 to 4 percent

Elevation: 4,400 to 5,450 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Amsterdam and similar soils: 60 percent

Quagle and similar soils: 30 percent

Minor Components

Beanlake gravelly loam: 0 to 6 percent

Meagher cobbly loam: 0 to 4 percent

Major Component Description

Amsterdam

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 11.1 inches

Quagle

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

453C—Amsterdam-Quagle silt loams, 4 to 8 percent slopes

Setting

Landform:

- Amsterdam—Relict stream terraces
- Quagle—Relict stream terraces

Slope:

- Amsterdam—4 to 8 percent
- Quagle—4 to 8 percent

Elevation: 4,400 to 5,500 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Amsterdam and similar soils: 60 percent

Quagle and similar soils: 30 percent

Minor Components

Beanlake gravelly loam: 0 to 4 percent

Bowery loam: 0 to 3 percent

Meagher cobbly loam: 0 to 3 percent

Major Component Description

Amsterdam

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

Quagle

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

453D—Amsterdam-Brodyk silt loams, 8 to 15 percent slopes

Setting

Landform:

- Amsterdam—Relict stream terraces
- Brodyk—Relict stream terraces

Slope:

- Amsterdam—8 to 15 percent
- Brodyk—8 to 15 percent

Elevation: 4,450 to 5,650 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Amsterdam and similar soils: 50 percent

Brodyk and similar soils: 35 percent

Minor Components

Bowery loam: 0 to 5 percent

Meagher cobbly loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Amsterdam

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

Brodyk

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Anceney Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Escarpments, alluvial fans, and relict stream terraces

Parent material: Alluvium or colluvium

Slope range: 8 to 60 percent

Elevation range: 4,500 to 6,150 feet

Annual precipitation: 12 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Entic Haplustolls

Typical Pedon

Anceney cobbly loam in an area of Anceney-Trimad-Meagher complex, 15 to 60 percent slopes, in an area of rangeland, 2,200 feet south and 1,600 feet west of the northeast corner of sec. 11, T. 2 S., R. 1 E.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) cobbly loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine roots; 10 percent cobbles and 15 percent pebbles; neutral; clear wavy boundary.

AB—6 to 10 inches; dark brown (10YR 3/3) gravelly loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine roots; 10 percent cobbles and 20 percent pebbles; neutral; clear wavy boundary.

Bk1—10 to 23 inches; pale brown (10YR 6/3) very gravelly loam, very dark brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine roots; 15 percent cobbles and 30 percent pebbles; few fine masses and seams of lime; common distinct lime coatings on underside of rock fragments; violently effervescent; slightly alkaline; gradual wavy boundary.

Bk2—23 to 60 inches; light brownish gray (10YR 6/3) very cobbly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; few very fine roots; 25 percent cobbles and 30 percent pebbles; common distinct lime coatings on underside of rock fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F
Moisture control section: Between 4 and 12 inches
Mollic epipedon thickness: 7 to 12 inches
Depth to the Bk horizon: 8 to 12 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist
 Chroma: 2 or 3
 Clay content: 18 to 27 percent
 Content of rock fragments: 15 to 35 percent—10 to 20 percent cobbles; 5 to 15 percent pebbles
 Reaction: pH 6.6 to 7.3

AB horizon

Value: 3 or 4 dry; 2 or 3 moist
 Chroma: 2 or 3
 Clay content: 18 to 27 percent
 Content of rock fragments: 20 to 50 percent—10 to 20 percent cobbles; 10 to 30 percent pebbles
 Reaction: pH 6.6 to 7.3

Bk1 horizon

Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 or 3
 Texture: Loam or sandy loam
 Clay content: 18 to 27 percent
 Content of rock fragments: 35 to 80 percent—15 to 30 percent cobbles; 20 to 50 percent pebbles
 Calcium carbonate equivalent: 15 to 30 percent
 Reaction: pH 7.4 to 8.4

Bk2 horizon

Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 or 3
 Texture: Loam or sandy loam
 Clay content: 15 to 27 percent
 Content of rock fragments: 35 to 80 percent—15 to 30 percent cobbles; 20 to 50 percent pebbles
 Calcium carbonate equivalent: 15 to 30 percent
 Reaction: pH 7.4 to 8.4

155F—Anceney cobbly loam, 15 to 60 percent slopes

Setting

Landform: Escarpments
Slope: 15 to 60 percent
Elevation: 4,500 to 5,900 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Anceney and similar soils: 90 percent

Minor Components

Meagher loam: 0 to 5 percent
 Bowery loam: 0 to 3 percent
 Cabba loam: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

255D—Anceney cobbly loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces
Slope: 8 to 15 percent
Elevation: 4,600 to 6,150 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Anceney and similar soils: 85 percent

Minor Components

Anceney very cobbly loam: 0 to 5 percent
 Meagher loam: 0 to 5 percent
 Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

755F—Anceney-Trimad-Meagher complex, 15 to 60 percent slopes

Setting

Landform:

- Anceney—Escarpments, north aspects
- Trimad—Escarpments, south aspects
- Meagher—Escarpments

Slope:

- Anceney—15 to 60 percent
- Trimad—15 to 60 percent
- Meagher—15 to 35 percent

Elevation: 4,500 to 5,700 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Anceney and similar soils: 40 percent

Trimad and similar soils: 30 percent

Meagher and similar soils: 20 percent

Minor Components

Bowery loam: 0 to 5 percent

Cabbart loam: 0 to 5 percent

Major Component Description

Anceney

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.0 inches

Trimad

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.4 inches

Meagher

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Arcette Series

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Permeability: Rapid

Landform: Mountains

Parent material: Igneous colluvium

Slope range: 15 to 35 percent

Elevation range: 6,250 to 7,900 feet

Annual precipitation: 25 to 30 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fragmental, mixed Ustic
Eutrocrypts

Typical Pedon

Arcette extremely bouldery sandy loam, 15 to 35 percent slopes, in an area of forest land, 2,800 feet south and 400 feet west of the northeast corner of sec. 1, T. 7 S., R. 3 E.

Oe—0 to 2 inches; moderately decomposed forest litter.

E—2 to 7 inches; light brownish gray (10YR 6/2) extremely bouldery sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few coarse roots; 25 percent boulders, 30 percent stones, and 25 percent cobbles; moderately acid; clear smooth boundary.

Bw—7 to 13 inches; light brownish gray (10YR 6/2) extremely stony sandy loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, and

nonplastic; common very fine and few fine roots; 25 percent stones, 20 percent cobbles, and 25 percent pebbles; strongly acid; gradual wavy boundary.

C—13 to 60 inches; pale brown (10YR 6/3) fragmental material, brown (10YR 4/3) moist; few fine roots; 35 percent stones, 20 percent cobbles, and 40 percent pebbles; moderately acid.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to fragmental material: 5 to 20 inches

E horizon

Hue: 7.5YR or 10YR

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2 through 6

Clay content: 10 to 20 percent

Content of rock fragments: 60 to 90 percent—20 to 25 percent boulders; 20 to 35 percent stones; 20 to 30 percent cobbles

Reaction: pH 5.1 to 6.5

Bw horizon

Hue: 7.5YR or 10YR

Value: 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2 through 6

Clay content: 10 to 12 percent

Content of rock fragments: 60 to 90 percent—20 to 30 percent stones; 15 to 25 percent cobbles; 25 to 35 percent pebbles

Reaction: pH 5.1 to 6.5

C horizon

Clay content: 10 to 12 percent

Content of rock fragments: 90 to 100 percent

Reaction: pH 5.1 to 6.5

695E—Arcette extremely bouldery sandy loam, 15 to 35 percent slopes

Setting

Landform: Mountains

Slope: 15 to 35 percent

Elevation: 6,250 to 7,900 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Arcette and similar soils: 90 percent

Minor Components

Rubble land: 0 to 8 percent

Stemple bouldery loam: 0 to 2 percent

Major Component Description

Surface layer texture: Extremely bouldery sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Igneous colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Attewan Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow above the 2C horizon and rapid in the 2C horizon

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 4 percent

Elevation range: 4,150 to 4,650 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Attewan clay loam, 0 to 4 percent slopes, in an area of pasture, 2,000 feet south and 2,500 feet west of the northeast corner of sec. 31, T. 1 N., R. 4 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; very hard, friable, nonsticky, and slightly plastic; many very fine and fine roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt—6 to 12 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure; very hard, friable, nonsticky, and slightly plastic; many very fine and fine roots; common distinct clay films on faces of pedis; 5 percent pebbles; slightly alkaline; clear wavy boundary.

Bk1—12 to 16 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak medium subangular

blocky; hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; 5 percent cobbles and 5 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—16 to 22 inches; light brownish gray (10YR 6/2) gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 20 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk3—22 to 26 inches; grayish brown (10YR 5/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; few very fine roots; 10 percent cobbles and 40 percent pebbles; few fine masses of lime; slightly effervescent; moderately alkaline; gradual wavy boundary.

2C—26 to 60 inches; grayish brown (10YR 5/2) very gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky, and nonplastic; 10 percent cobbles and 50 percent pebbles; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 12 inches

Depth to the Bk horizon: 10 to 21 inches

Depth to the 2C horizon: 20 to 40 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

Bk1 and Bk2 horizons

Hue: 10YR or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2, 3, 4, or 6

Texture: Loam, clay loam, silt loam, sandy clay loam, or sandy loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles; 0 to 25 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Bk3 horizon

Hue: 10YR or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2, 3, 4, or 6

Texture: Loam, clay loam, silt loam, sandy clay loam, or sandy loam

Clay content: 15 to 30 percent

Content of rock fragments: 35 to 60 percent—10 to 15 percent cobbles; 25 to 45 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

2C horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 75 percent—0 to 15 percent cobbles; 35 to 60 percent pebbles

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 8.4

33B—Attewan clay loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 4 percent

Elevation: 4,150 to 4,650 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Attewan and similar soils: 90 percent

Minor Components

Beaverell cobbly loam: 0 to 5 percent

Beavwan loam: 0 to 5 percent

Major Component Description

Surface layer texture: Clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bacbuster Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Hills and escarpments

Parent material: Interbedded sandstone and shale residuum

Slope range: 4 to 45 percent

Elevation range: 4,400 to 6,800 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine, mixed, superactive, frigid
Typic Argiustolls

Typical Pedon

Bacbuster clay loam, in an area of Bacbuster-Wilsall-Castner complex, 15 to 45 percent slopes, in an area of rangeland, 1,500 feet north and 1,000 feet east of the southwest corner of sec. 27, T. 5 N., R. 5 E.

A—0 to 4 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common fine and few medium roots; slightly alkaline; clear smooth boundary.

Bt1—4 to 9 inches; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and very plastic; common very fine and fine and few medium roots; common distinct clay films on faces of pedis and lining pores; 10 percent soft shale chips; slightly alkaline; clear smooth boundary.

Bt2—9 to 15 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and very plastic; few very fine and fine roots; common prominent clay films on

faces of pedis and lining pores; 20 percent soft shale chips; slightly alkaline; clear smooth boundary.

Btk—15 to 25 inches; gray (10YR 5/1) clay loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of pedis and lining pores; 25 percent soft shale chips; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk—25 to 36 inches; gray (10YR 5/1) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; 50 percent soft shale chips; many medium threads of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Cr—36 to 60 inches; gray (10YR 5/1) semiconsolidated shale; few lime coatings on shale fragments.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 10 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Value: 4 or 5 dry

Chroma: 2 or 3

Texture: Clay loam or silty clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 25 percent—0 to 15 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bt1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, clay, or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles; 0 to 15 percent soft shale chips

Reaction: pH 6.6 to 7.8

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Chroma: 2, 3, or 4

Texture: Clay loam, clay, or silty clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles; 0 to 25 percent soft shale chips

Reaction: pH 6.6 to 7.8

Btk horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Chroma: 1, 2, 3, or 4

Texture: Clay loam or silty clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles; 0 to 30 percent soft shale chips

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry

Chroma: 1, 2, 3, or 4

Texture: Clay loam or silty clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles; 15 to 60 percent soft shale chips

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

**315D—Bacbuster-Cabba complex,
4 to 15 percent slopes**

Setting

Landform:

- Bacbuster—Hills
- Cabba—Hills

Slope:

- Bacbuster—4 to 15 percent
- Cabba—4 to 15 percent

Elevation: 4,500 to 5,850 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Bacbuster and similar soils: 70 percent

Cabba and similar soils: 20 percent

Minor Components

Norbert silty clay loam: 0 to 5 percent

Castner channery loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Bacbuster

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.6 inches

Cabba

Surface layer texture: Loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**260D—Bacbuster-Wilsall complex,
4 to 15 percent slopes**

Setting

Landform:

- Bacbuster—Hills
- Wilsall—Hills

Slope:

- Bacbuster—4 to 15 percent
- Wilsall—4 to 15 percent

Elevation: 4,600 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Bacbuster and similar soils: 60 percent

Wilsall and similar soils: 30 percent

Minor Components

Castner very flaggy loam: 0 to 5 percent

Reedwest loam: 0 to 5 percent

Major Component Description

Bacbuster

Surface layer texture: Silty clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.6 inches

Wilsall

Surface layer texture: Clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

860D—Bacbuster-Wilsall-Castner complex, 4 to 15 percent slopes

Setting

Landform:

- Bacbuster—Hills
- Wilsall—Hills
- Castner—Hills

Slope:

- Bacbuster—4 to 15 percent
- Wilsall—4 to 15 percent
- Castner—4 to 15 percent

Elevation: 4,400 to 6,200 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Bacbuster and similar soils: 60 percent
 Wilsall and similar soils: 15 percent
 Castner and similar soils: 15 percent

Minor Components

Work clay loam: 0 to 8 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Bacbuster

Surface layer texture: Clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.6 inches

Wilsall

Surface layer texture: Clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

Castner

Surface layer texture: Very channery loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

860E—Bacbuster-Wilsall-Castner complex, 15 to 45 percent slopes

Setting

Landform:

- Bacbuster—Hills
- Wilsall—Hills
- Castner—Hills

Slope:

- Bacbuster—15 to 45 percent
- Wilsall—15 to 45 percent
- Castner—15 to 45 percent

Elevation: 4,500 to 6,800 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Bacbuster and similar soils: 50 percent
 Wilsall and similar soils: 20 percent
 Castner and similar soils: 20 percent

Minor Components

Work clay loam: 0 to 8 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Bacbuster

Surface layer texture: Clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.6 inches

Wilsall

Surface layer texture: Clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.9 inches

Castner

Surface layer texture: Very channery loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bandy Series

Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderate to the 2C horizon and rapid in the 2C horizon

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,050 to 5,800 feet

Annual precipitation: 12 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Endoaquolls

Typical Pedon

Bandy loam, in an area of Bandy-Riverwash-Bonebasin complex, 0 to 2 percent slopes, in an area of woodland, 1,200 feet north and 2,600 feet east of the southwest corner of sec. 30, T. 3 S., R. 5 E.

A—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium and coarse roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bw—8 to 17 inches; very dark brown (10YR 2/2) sandy loam, grayish brown (10YR 5/2) dry; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; weak medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium and coarse roots, 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

2C—17 to 60 inches; dark brown (10YR 3/3) very cobbly loamy coarse sand, brown (10YR 4/3) dry; common fine distinct dark yellowish brown (10YR 4/6) redox concentrations; single grain; loose, nonsticky, and nonplastic; few very fine roots; 20 percent cobbles and 30 percent pebbles; slightly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 8 and 12 inches

Mollic epipedon thickness: 10 to 19 inches

Depth to seasonal high water table: 12 to 24 inches

Depth to the 2C horizon: 12 to 20 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

Bw horizon

Value: 4 or 5 dry; 2 or 3 moist
 Chroma: 1 or 2
 Texture: Sandy loam or loam
 Clay content: 5 to 18 percent
 Content of rock fragments: 5 to 35 percent—0 to 15 percent cobbles; 5 to 20 percent pebbles
 Reaction: pH 6.6 to 7.8

2C horizon

Value: 4, 5, or 6 dry
 Texture: Sand, loamy sand, or loamy coarse sand
 Clay content: 2 to 10 percent
 Content of rock fragments: 35 to 70 percent—5 to 20 percent cobbles; 30 to 50 percent pebbles
 Reaction: pH 6.6 to 7.8

605A—Bandy-Bonebasin loams, 0 to 2 percent slopes

Setting

Landform:

- Bandy—Flood plains
- Bonebasin—Flood plains

Slope:

- Bandy—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 4,050 to 4,400 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Bandy and similar soils: 60 percent
 Bonebasin and similar soils: 25 percent

Minor Components

Nesda cobbly loam: 0 to 8 percent
 Sudworth loam: 0 to 5 percent
 Water: 0 to 2 percent

Major Component Description

Bandy

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: Occasional
Water table: Apparent
Available water capacity: Mainly 3.1 inches

Bonebasin

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Occasional
Water table: Apparent
Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

606A—Bandy-Riverwash-Bonebasin complex, 0 to 2 percent slopes

Setting

Landform:

- Bandy—Flood plains
- Riverwash—Flood plains
- Bonebasin—Flood plains

Slope:

- Bandy—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 4,200 to 5,800 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Bandy and similar soils: 50 percent
 Riverwash: 25 percent
 Bonebasin and similar soils: 10 percent

Minor Components

Blossberg loam: 0 to 5 percent
 Nesda cobbly loam: 0 to 5 percent
 Water: 0 to 5 percent

Major Component Description

Bandy

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: Occasional
Water table: Apparent
Available water capacity: Mainly 3.1 inches

Riverwash

Definition: Unstable areas of sandy, gravelly, or cobbly sediments; frequently flooded; and supporting little or no vegetation.

Dominant parent material: Alluvium

Flooding: Frequent

Bonebasin

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Water table: Apparent

Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bangtail Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Hills, mountains, and escarpments

Parent material: Interbedded sandstone and shale residuum or semiconsolidated, clayey sedimentary beds

Slope range: 4 to 60 percent

Elevation range: 4,800 to 8,000 feet

Annual precipitation: 17 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Ustic Argicryolls

Typical Pedon

Bangtail loam, in an area of Bangtail-Copenhaver complex, 8 to 25 percent slopes, in an area of rangeland, 2,100 feet north and 1,200 feet west of the southeast corner of sec. 24, T. 2 S., R. 7 E.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; many very fine, common fine, and few medium pores; 5 percent channers,

10 percent soft shale chips; slightly acid; clear smooth boundary.

Bt1—9 to 14 inches; brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; many very fine and few fine and medium pores; few faint clay films on faces of peds; 5 percent channers, 10 percent soft shale chips; slightly acid; clear smooth boundary.

Bt2—14 to 23 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, very sticky, and very plastic; common very fine and fine and few medium roots; common very fine and few fine and medium pores; common distinct clay films on faces of peds; 5 percent channers, 15 percent soft shale chips; slightly acid; clear wavy boundary.

C—23 to 37 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common very fine and few fine and medium pores; 5 percent channers, 20 percent soft shale chips; neutral; gradual wavy boundary.

Cr—37 to 60 inches; olive yellow (2.5Y 6/6) interbedded soft shale and fine grained sandstone; neutral.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 15 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Texture: Clay loam or loam

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 30 percent—0 to 5 percent stones; 0 to 5 percent cobbles or flagstones; 5 to 15 percent pebbles or channers; 10 to 20 percent soft shale chips

Reaction: pH 5.6 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam or clay

Clay content: 35 to 50 percent
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles or flagstones; 5 to 15 percent pebbles or channers; 10 to 20 percent soft shale chips
 Reaction: pH 5.6 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y
 Value: 4, 5, or 6 dry; 3, 4, or 5 moist
 Chroma: 2, 3, or 4
 Texture: Clay loam or clay
 Clay content: 35 to 50 percent
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles or flagstones; 5 to 15 percent pebbles or channers; 10 to 20 percent soft shale chips
 Reaction: pH 6.1 to 7.3

C horizon

Hue: 10YR or 2.5Y
 Value: 5 or 6 dry; 3, 4, or 5 moist
 Chroma: 2, 3, or 4
 Texture: Clay loam or clay
 Clay content: 27 to 45 percent
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles or flagstones; 5 to 15 percent pebbles or channers; 10 to 25 percent soft shale chips
 Reaction: pH 6.1 to 7.3

479F—Bangtail clay loam, 35 to 60 percent slopes

Setting

Landform: Hills
Slope: 35 to 60 percent
Elevation: 4,900 to 6,900 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 85 percent

Minor Components

Copenhaver flaggy loam: 0 to 8 percent
 Timberlin stony loam: 0 to 5 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

679D—Bangtail-Adel loams, 4 to 25 percent slopes

Setting

Landform:

- Bangtail—Hills
- Adel—Hills

Slope:

- Bangtail—4 to 25 percent
- Adel—4 to 25 percent

Elevation: 5,250 to 6,650 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 45 percent

Adel and similar soils: 40 percent

Minor Components

Copenhaver flaggy loam: 0 to 5 percent

Doby clay loam: 0 to 5 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Major Component Description

Bangtail

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.8 inches

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

579E—Bangtail-Adel, cool, loams, 8 to 25 percent slopes

Setting

Landform:

- Bangtail—Hills
- Adel—Hills

Slope:

- Bangtail—8 to 25 percent
- Adel—8 to 25 percent

Elevation: 5,700 to 6,650 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 60 percent

Adel and similar soils: 25 percent

Minor Components

Libeg stony loam: 0 to 8 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Redlodge silty clay loam: 0 to 2 percent

Major Component Description

Bangtail

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.8 inches

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

479E—Bangtail-Bridger complex, 15 to 45 percent slopes

Setting

Landform:

- Bangtail—Hills
- Bridger—Drainageways

Slope:

- Bangtail—15 to 45 percent
- Bridger—15 to 45 percent

Elevation: 5,000 to 6,500 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 60 percent

Bridger and similar soils: 30 percent

Minor Components

Timberlin stony loam: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 4 percent

Redlodge silty clay loam: 0 to 1 percent

Major Component Description

Bangtail

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.9 inches

Bridger

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

679F—Bangtail-Copenhaver complex, 35 to 60 percent slopes

Setting

Landform:

- Bangtail—Hills
- Copenhaver—Hills

Slope:

- Bangtail—35 to 60 percent
- Copenhaver—35 to 60 percent

Elevation: 5,300 to 8,000 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 70 percent

Copenhaver and similar soils: 20 percent

Minor Components

Redchief stony loam: 0 to 6 percent

Rock outcrop: 0 to 4 percent

Major Component Description

Bangtail

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.8 inches

Copenhaver

Surface layer texture: Flaggy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

679E—Bangtail-Copenhaver complex, 8 to 25 percent slopes

Setting

Landform:

- Bangtail—Hills
- Copenhaver—Hills

Slope:

- Bangtail—8 to 25 percent
- Copenhaver—8 to 25 percent

Elevation: 6,100 to 7,800 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 60 percent

Copenhaver and similar soils: 25 percent

Minor Components

Redchief stony loam: 0 to 8 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Bangtail

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.8 inches

Copenhaver

Surface layer texture: Flaggy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

879E—Bangtail-Copenhaver-Adel complex, 15 to 35 percent slopes

Setting

Landform:

- Bangtail—Hills
- Copenhaver—Hills
- Adel—Hills

Slope:

- Bangtail—15 to 35 percent
- Copenhaver—15 to 35 percent
- Adel—15 to 35 percent

Elevation: 5,400 to 7,200 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 40 percent

Copenhaver and similar soils: 30 percent

Adel and similar soils: 20 percent

Minor Components

Doby clay loam: 0 to 6 percent

Redlodge silty clay loam: 0 to 2 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Bangtail

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.8 inches

Copenhaver

Surface layer texture: Flaggy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

979E—Bangtail-Doby-Redlodge complex, 4 to 45 percent slopes

Setting

Landform:

- Bangtail—Hills
- Doby—Hills
- Redlodge—Drainageways

Slope:

- Bangtail—15 to 45 percent
- Doby—15 to 45 percent
- Redlodge—4 to 6 percent

Elevation: 5,900 to 6,600 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 40 percent

Doby and similar soils: 35 percent

Redlodge and similar soils: 15 percent

Minor Components

Adel loam: 0 to 5 percent

Copenhaver flaggy loam: 0 to 5 percent

Major Component Description

Bangtail

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.8 inches

Doby

Surface layer texture: Clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.6 inches

Redlodge

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Available water capacity: Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

693F—Bangtail-Timberlin complex, 35 to 60 percent slopes, stony

Setting

Landform:

- Bangtail—Mountains
- Timberlin—Mountains

Slope:

- Bangtail—35 to 60 percent
- Timberlin—35 to 60 percent

Elevation: 4,800 to 7,500 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 60 percent
 Timberlin and similar soils: 30 percent

Minor Components

Copenhaver flaggy loam: 0 to 8 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Bangtail

Surface layer texture: Gravelly loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 6.6 inches

Timberlin

Surface layer texture: Flaggy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

494F—Bangtail-Timberlin complex, moist, 35 to 60 percent slopes, stony

Setting

Landform:

- Bangtail—Mountains
- Timberlin—Mountains

Slope:

- Bangtail—35 to 60 percent
- Timberlin—35 to 60 percent

Elevation: 5,000 to 7,100 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 45 percent
Timberlin and similar soils: 40 percent

Minor Components

Yellowmule loam: 0 to 8 percent
Cowood channery sandy loam: 0 to 5 percent
Rock outcrop: 0 to 2 percent

Major Component Description

Bangtail

Surface layer texture: Gravelly loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 6.6 inches

Timberlin

Surface layer texture: Flaggy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

693E—Bangtail-Timberlin, stony complex, 15 to 45 percent slopes

Setting

Landform:

- Bangtail—Mountains
- Timberlin—Mountains

Slope:

- Bangtail—15 to 45 percent
- Timberlin—15 to 45 percent

Elevation: 5,000 to 7,200 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 60 percent
Timberlin and similar soils: 30 percent

Minor Components

Copenhaver flaggy loam: 0 to 5 percent
Adel loam: 0 to 4 percent
Rock outcrop: 0 to 1 percent

Major Component Description

Bangtail

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 6.8 inches

Timberlin

Surface layer texture: Flaggy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

494E—Bangtail-Timberlin, stony complex, moist 15 to 45 percent slopes

Setting

Landform:

- Bangtail—Mountains
- Timberlin—Mountains

Slope:

- Bangtail—15 to 45 percent
- Timberlin—15 to 45 percent

Elevation: 5,050 to 7,200 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bangtail and similar soils: 50 percent
Timberlin and similar soils: 40 percent

Minor Components

Yellowmule loam: 0 to 5 percent
Cowood channery sandy loam: 0 to 3 percent
Rock outcrop: 0 to 2 percent

Major Component Description

Bangtail

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 6.8 inches

Timberlin

Surface layer texture: Flaggy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 2.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Barbarela Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Landform: Hills
Parent material: Colluvium or gneiss or schist residuum
Slope range: 4 to 45 percent
Elevation range: 5,000 to 7,300 feet
Annual precipitation: 20 to 24 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive Ustic Argicryolls

Typical Pedon

Barbarela coarse sandy loam, in an area of Barbarela-Poin, stony-Bavdark complex, 15 to 45 percent slopes, in an area of rangeland, 1,100 feet south and 2,300 feet west of the northeast corner of sec. 25, T. 3 S., R. 3 E.

- A—0 to 11 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine, common fine, and few medium roots; 10 percent pebbles; neutral; clear wavy boundary.
- AB—11 to 15 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 10 percent pebbles; neutral; clear wavy boundary.
- Bt—15 to 37 inches; yellowish brown (10YR 5/4) sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.
- Cr—37 to 52 inches; highly weathered, decomposed gneiss bedrock that crushes to a very gravelly coarse sand.
- R—52 inches; hard gneiss bedrock.

Range in Characteristics

Soil temperature: 36 to 40 degrees F
Moisture control section: Between 4 and 12 inches
Mollic epipedon thickness: 8 to 16 inches
Depth to the Cr horizon: 20 to 40 inches
Depth to the R horizon: 40 to 60 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist
Chroma: 1 or 2
Clay content: 12 to 20 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.3

AB horizon

Value: 3 or 4 dry; 2 or 3 moist
Clay content: 12 to 20 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
Reaction: pH 6.1 to 7.3

Bt horizon

Value: 3 or 4 moist
 Chroma: 3, 4, 5, or 6
 Clay content: 20 to 30 percent
 Content of rock fragments: 10 to 30 percent—0 to
 5 percent cobbles; 5 to 25 percent pebbles
 Reaction: pH 6.1 to 7.3

782E—Barbarela-Poin, stony-Bavdark complex, 15 to 45 percent slopes

Setting

Landform:

- Barbarela—Hills
- Poin—Hills
- Bavdark—Hills

Slope:

- Barbarela—15 to 45 percent
- Poin—15 to 45 percent
- Bavdark—15 to 45 percent

Elevation: 5,000 to 7,300 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Barbarela and similar soils: 50 percent

Poin and similar soils: 25 percent

Bavdark and similar soils: 15 percent

Minor Components

Rock outcrop: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Major Component Description

Barbarela

Surface layer texture: Coarse sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.3 inches

Poin

Surface layer texture: Very cobbly coarse sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.2 inches

Bavdark

Surface layer texture: Coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

782D—Barbarela-Poin, stony-Bavdark complex, 4 to 15 percent slopes

Setting

Landform:

- Barbarela—Hills
- Poin—Hills
- Bavdark—Hills

Slope:

- Barbarela—4 to 15 percent
- Poin—4 to 15 percent
- Bavdark—4 to 15 percent

Elevation: 5,950 to 7,300 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Barbarela and similar soils: 50 percent

Poin and similar soils: 25 percent

Bavdark and similar soils: 20 percent

Minor Components

Rock outcrop: 0 to 5 percent

Major Component Description

Barbarela

Surface layer texture: Coarse sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.3 inches

Poin

Surface layer texture: Very cobbly coarse sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.2 inches

Bavdark

Surface layer texture: Coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bavdark Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Hills, drainageways, alluvial fans, and stream terraces

Parent material: Alluvium or colluvium

Slope range: 4 to 50 percent

Elevation range: 5,000 to 7,300 feet

Annual precipitation: 17 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Pachic Argicryolls

Typical Pedon

Bavdark coarse sandy loam, in an area of Barbarela-Poin, stony-Bavdark complex, 4 to 15 percent slopes, in an area of rangeland, 900 feet north and 2,300 feet west of the southeast corner of sec. 33, T. 3 S., R. 3 E.

A—0 to 10 inches; dark gray (10YR 4/1) coarse sandy loam, black (10YR 2/1) moist; weak medium granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; many very fine and common fine and medium pores; 5 percent pebbles; slightly acid; clear smooth boundary.

AB—10 to 18 inches; dark gray (10YR 4/1) sandy clay loam, very dark gray (10YR 3/1) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; many very fine, common fine, and few medium pores; 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—18 to 30 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, very friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; many very fine, common fine, and few medium pores; common faint clay films on faces of peds and lining pores; 5 percent pebbles; slightly acid; clear wavy boundary.

Bt2—30 to 42 inches; brown (10YR 5/3) sandy clay loam, very dark grayish brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, very friable, moderately sticky, and slightly plastic; few very fine, fine, and medium roots; many very fine, common fine, and few medium pores; common faint clay films on faces of peds and lining pores; 5 percent pebbles; slightly acid; clear wavy boundary.

C—42 to 60 inches; brown (10YR 5/3) coarse sandy loam; brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky, and nonplastic; few very fine and fine roots; many very fine, common fine, and few medium pores; 10 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 18 to 45 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist

Texture: Coarse sandy loam, sandy loam, or loam

Clay content: 12 to 25 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

AB horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Coarse sandy loam or sandy clay loam

Clay content: 12 to 25 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

Bt1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Sandy clay loam or clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

Bt2 horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 3 or 4

Texture: Sandy clay loam or clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

C horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Sandy clay loam or coarse sandy loam

Clay content: 12 to 25 percent

Content of rock fragments: 10 to 30 percent—0 to 10 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

182E—Bavdark gravelly coarse sandy loam, 8 to 25 percent slopes, stony**Setting***Landform:* Alluvial fans and stream terraces*Slope:* 8 to 25 percent*Elevation:* 5,850 to 6,350 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Bavdark and similar soils: 90 percent

Minor Components

Bavdark loam: 0 to 5 percent

Libeg very stony loam: 0 to 3 percent

Soils with slopes more than 25 percent: 0 to 2 percent

Major Component Description*Surface layer texture:* Gravelly coarse sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 7.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

282E—Bavdark loam, 8 to 25 percent slopes**Setting***Landform:* Alluvial fans*Slope:* 8 to 25 percent*Elevation:* 5,200 to 5,550 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Bavdark and similar soils: 90 percent

Minor Components

Bridger loam: 0 to 5 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Major Component Description*Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

382E—Bavdark sandy loam, moist, 8 to 35 percent slopes**Setting***Landform:* Drainageways*Slope:* 8 to 35 percent*Elevation:* 5,200 to 6,250 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days

Composition

Major Components

Bavdark and similar soils: 90 percent

Minor Components

Shadow stony coarse sandy loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 3 percent

Mooseflat loam: 0 to 2 percent

Major Component Description

Surface layer texture: Sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

582E—Bavdark, moist-Bavdark-Mooseflat loams, 4 to 25 percent slopes

Setting

Landform:

- Bavdark—Drainageways
- Bavdark—Drainageways
- Mooseflat—Drainageways

Slope:

- Bavdark—4 to 25 percent
- Bavdark—4 to 25 percent
- Mooseflat—4 to 8 percent

Elevation: 5,400 to 6,600 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bavdark and similar soils: 40 percent

Bavdark and similar soils: 30 percent

Mooseflat and similar soils: 15 percent

Minor Components

Libeg stony loam: 0 to 5 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Soils with a water table at 1.5 to 4 feet: 0 to 5 percent

Major Component Description

Bavdark, moist

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 8.3 inches

Bavdark

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

Mooseflat

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 4.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Beanlake Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Alluvial fans, relict stream terraces, stream terraces, and escarpments

Parent material: Alluvium

Slope range: 0 to 45 percent

Elevation range: 4,300 to 6,550 feet

Annual precipitation: 12 to 19 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Calciustolls

Typical Pedon

Beanlake gravelly loam, 8 to 15 percent slopes, in an area of rangeland, 1,500 feet south and 1,400 feet east of the northwest corner of sec. 10, T. 2 S., R. 3 E.

A—0 to 6 inches; grayish brown (10YR 5/2) gravelly loam; very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; 5 percent cobbles and 15 percent pebbles; many very fine and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—6 to 13 inches; light gray (10YR 7/2) loam; pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, very friable, moderately sticky, and slightly plastic; common very fine and fine roots; 5 percent pebbles; common fine masses and seams of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—13 to 26 inches; light gray (10YR 7/2) loam; pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; 10 percent pebbles; common fine masses and seams of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—26 to 60 inches; light gray (10YR 7/2) gravelly loam; light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; 5 percent cobbles and 20 percent pebbles; few very fine and fine roots; common fine masses and seams of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 8 inches

Depth to the Bk horizon: 5 to 8 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Loam or silt loam

Clay content: 18 to 25 percent

Content of rock fragments: 0 to 30 percent—0 to 15 percent stones and cobbles; 0 to 15 percent pebbles

Reaction: pH 7.9 to 8.4

Bk horizons

Value: 5, 6, 7, or 8 dry; 3, 4, 5, or 6 moist

Chroma: 2 or 3

Clay content: 18 to 25 percent

Content of rock fragments: 5 to 35 percent—0 to

15 percent cobbles; 5 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.9 to 8.4

363E—Beanlake cobbly loam, 15 to 35 percent slopes, stony

Setting

Landform: Alluvial fans and stream terraces

Slope: 15 to 35 percent

Elevation: 4,600 to 6,350 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beanlake and similar soils: 90 percent

Minor Components

Soils with slopes more than 35 percent: 0 to 5 percent

Windham bouldery loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

363D—Beanlake cobbly loam, 8 to 15 percent slopes, stony

Setting

Landform: Alluvial fans and stream terraces

Slope: 8 to 15 percent

Elevation: 4,650 to 6,550 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beanlake and similar soils: 85 percent

Minor Components

Beanlake gravelly loam: 0 to 5 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Windham bouldery loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

163C—Beanlake gravelly loam, 4 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 4 to 8 percent

Elevation: 4,350 to 5,750 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beanlake and similar soils: 85 percent

Minor Components

Beanlake cobbly loam: 0 to 10 percent

Windham very cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

163D—Beanlake gravelly loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 8 to 15 percent

Elevation: 4,450 to 5,750 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beanlake and similar soils: 85 percent

Minor Components

Windham stony loam: 0 to 8 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

63B—Beanlake loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans

Slope: 0 to 4 percent

Elevation: 4,300 to 5,850 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beanlake and similar soils: 85 percent

Minor Components

Beanlake gravelly loam: 0 to 5 percent

Martinsdale loam: 0 to 5 percent

Windham cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

463B—Beanlake silt loam, moderately wet, 1 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 1 to 4 percent

Elevation: 4,300 to 5,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beanlake and similar soils: 85 percent

Minor Components

Beanlake cobbly loam: 0 to 8 percent

Fairway loam: 0 to 5 percent

Trimad cobbly loam: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 8.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

663B—Beanlake-Corbly complex, 0 to 4 percent slopes

Setting

Landform:

- Beanlake—Alluvial fans and stream terraces
- Corbly—Alluvial fans and stream terraces

Slope:

- Beanlake—0 to 4 percent
- Corbly—0 to 4 percent

Elevation: 4,300 to 4,650 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beanlake and similar soils: 60 percent

Corbly and similar soils: 30 percent

Minor Components

Corbly very cobbly loam: 0 to 5 percent

Quigley loam: 0 to 5 percent

Major Component Description

Beanlake

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

Corbly

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Beaverell Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate above the sandy-skeletal material and rapid in the sandy-skeletal material

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,100 to 5,000 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Loamy-skeletal over sandy or sandy-skeletal, mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Beaverell cobbly loam, 0 to 2 percent slopes, in an area of cropland, 100 feet north and 150 feet west of the southeast corner of sec. 33, T. 1 N., R. 4 E.

Ap—0 to 7 inches; brown (10YR 5/3) cobbly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and common fine roots; 10 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—7 to 13 inches; dark grayish brown (10YR 4/2) very cobbly clay loam, dark brown (10YR 4/3) moist; strong medium angular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine and common fine roots; common distinct clay films on faces of peds and lining pores; 25 percent cobbles and 20 percent pebbles; neutral; clear wavy boundary.

Bt2—13 to 20 inches; dark grayish brown (10YR 4/2) extremely cobbly sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, moderately sticky, and moderately plastic; common very fine and fine roots; few faint clay films on faces of peds and lining pores; 35 percent cobbles and 30 percent pebbles; neutral; gradual wavy boundary.

2Bk1—20 to 24 inches; dark grayish brown (10YR 4/2) extremely cobbly coarse sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky

structure; soft, loose, nonsticky, and nonplastic; common very fine and few fine roots; 35 percent cobbles and 35 percent pebbles; common fine masses of lime; strongly effervescent; slightly alkaline; gradual wavy boundary.

2Bk2—24 to 60 inches; variegated extremely cobbly loamy coarse sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky, and nonplastic; few very fine roots; 50 percent cobbles and 35 percent pebbles; few fine masses of lime; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 11 inches

Depth to the Bk horizon: 10 to 20 inches

Ap horizon

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 15 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizons

Value: 3, 4, or 5 dry; 2, 3, or 4 moist

Chroma: 2, 3, or 4

Texture: Sandy clay loam, clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 60 percent—10 to 35 percent cobbles; 25 to 35 percent pebbles

Reaction: pH 6.6 to 7.3

2Bk1 horizon

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Coarse sandy loam or sandy loam

Clay content: 10 to 15 percent

Content of rock fragments: 35 to 75 percent—10 to 35 percent cobbles; 25 to 40 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

2Bk2 horizon

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Loamy sand, loamy coarse sand, sand, or coarse sand

Clay content: 0 to 5 percent

Content of rock fragments: 40 to 75 percent—15 to 50 percent cobbles; 25 to 55 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

241A—Beaverell cobbly loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Slope: 0 to 2 percent
Elevation: 4,250 to 4,650 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Beaverell and similar soils: 85 percent

Minor Components

Attewan loam: 0 to 5 percent
 Beaverell very cobbly loam: 0 to 5 percent
 Scravo cobbly sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

41A—Beaverell loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces
Slope: 0 to 2 percent
Elevation: 4,200 to 4,650 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Beaverell and similar soils: 90 percent

Minor Components

Attewan loam: 0 to 5 percent
 Beaverell cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

741A—Beaverell-Beavwan complex, 0 to 2 percent slopes

Setting

Landform:

- Beaverell—Stream terraces
- Beavwan—Stream terraces

Slope:

- Beaverell—0 to 2 percent
- Beavwan—0 to 2 percent

Elevation: 4,100 to 5,000 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Beaverell and similar soils: 55 percent
 Beavwan and similar soils: 30 percent

Minor Components

Attewan clay loam: 0 to 5 percent
 Beaverell very cobbly clay loam: 0 to 5 percent
 Channeled areas: 0 to 5 percent

Major Component Description

Beaverell

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.2 inches

Beavwan

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

341A—Beaverell-Beavwan loams, moderately wet, 0 to 2 percent slopes

Setting

Landform:

- Beaverell—Stream terraces
- Beavwan—Stream terraces

Slope:

- Beaverell—0 to 2 percent
- Beavwan—0 to 2 percent

Elevation: 4,100 to 4,750 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Beaverell and similar soils: 60 percent

Beavwan and similar soils: 30 percent

Minor Components

Beaverell cobbly loam: 0 to 5 percent

Attewan loam: 0 to 3 percent

Channeled areas: 0 to 2 percent

Major Component Description

Beaverell

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 3.4 inches

Beavwan

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 4.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Beaverton Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate above the 2C horizon and rapid in the 2C horizon

Landform: Stream terraces and alluvial fans

Parent material: Alluvium

Slope range: 0 to 6 percent

Elevation range: 4,350 to 6,150 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal over sandy or sandy-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Beaverton cobbly loam, 0 to 4 percent slopes, in an area of pasture, 1,300 feet south and 1,200 feet west of the northeast corner of sec. 14, T. 1 N., R. 5 E.

A—0 to 5 inches; brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 10 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bt1—5 to 11 inches; dark grayish brown (10YR 4/2) very gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 15 percent cobbles and 40 percent pebbles; neutral; clear smooth boundary.

Bt2—11 to 21 inches; brown (10YR 5/3) very cobbly sandy clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and fine and few medium roots;

25 percent cobbles and 35 percent pebbles;
neutral; clear smooth boundary.

Bk1—21 to 25 inches; variegated very cobbly coarse sandy loam; weak fine subangular blocky structure; loose, nonsticky, and nonplastic; few very fine and fine roots; 30 percent cobbles and 30 percent pebbles; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

2Bk2—25 to 60 inches; variegated extremely cobbly loamy coarse sand; single grain; loose, nonsticky, and nonplastic; few very fine roots; 35 percent cobbles and 40 percent pebbles; common fine masses of lime; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 8 and 24 inches

Mollic epipedon thickness: 7 to 14 inches

Depth to the Bk horizon: 10 to 20 inches

A horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 5 to 25 percent—0 to 15 percent cobbles; 5 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 2.5Y, 10YR, or 7.5YR

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 35 to 60 percent—0 to 30 percent cobbles; 15 to 45 percent pebbles

Reaction: pH 6.6 to 7.8

Bk1 horizon

Texture: Sandy loam or coarse sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 35 to 80 percent—0 to 35 percent cobbles; 15 to 60 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

2Bk2 horizon

Texture: Loamy sand, sand, or loamy coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to 35 percent cobbles; 15 to 65 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

249A—Beaverton cobbly clay loam, 0 to 2 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 0 to 2 percent

Elevation: 4,450 to 5,900 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beaverton and similar soils: 90 percent

Minor Components

Beaverton very cobbly loam: 0 to 5 percent

Turner loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

149B—Beaverton cobbly loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 0 to 4 percent

Elevation: 4,400 to 5,850 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beaverton and similar soils: 90 percent

Minor Components

Beaverton very cobbly loam: 0 to 5 percent

Hyalite loam: 0 to 3 percent

Corbly very cobbly loam: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

349C—Beaverton very cobbly loam, 2 to 6 percent slopes, very stony

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 6 percent
Elevation: 4,850 to 5,900 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Beaverton and similar soils: 90 percent

Minor Components

Turner stony loam: 0 to 6 percent
 Soils with slopes more than 6 percent: 0 to 4 percent

Major Component Description

Surface layer texture: Very cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Beavwan Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow above the 2Bk horizon and rapid in the 2Bk horizon
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation range: 4,100 to 5,000 feet
Annual precipitation: 10 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Beavwan loam, in an area of Beaverell-Beavwan complex, 0 to 2 percent slopes, in an area of pasture, 2,400 feet south and 100 feet west of the northeast corner of sec. 35, T. 1 N., R. 4 E.

A—0 to 5 inches; dark grayish brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt1—5 to 7 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, moderately sticky, and slightly plastic; common very fine and fine and few medium roots; common faint clay films on faces of peds; 5 percent pebbles; neutral; clear wavy boundary.

Bt2—7 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common faint clay films on faces of peds; 5 percent pebbles; slightly alkaline; clear wavy boundary.

2Bt3—15 to 22 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few

medium roots; few faint clay films bridging sand grains; 25 percent cobbles and 30 percent pebbles; lime occurs on undersides of rock fragments; slightly alkaline; gradual wavy boundary.

2Bk1—22 to 28 inches; pale brown (10YR 6/3) extremely cobbly sandy loam; grayish brown (10YR 5/2) moist; weak fine granular structure; soft, loose, nonsticky, and nonplastic; few very fine and fine roots; 25 percent cobbles and 40 percent pebbles; common distinct lime coatings on rock fragments, disseminated lime; violently effervescent; moderately alkaline; clear wavy boundary.

2Bk2—28 to 60 inches; variegated extremely cobbly loamy coarse sand; single grain; loose, nonsticky, and nonplastic; 30 percent cobbles and 50 percent pebbles; common distinct lime coats on undersides of coarse fragments; violently effervescent, moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 12 inches

Depth to sandy-skeletal material: 14 to 35 inches

A horizon

Value: 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizons

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Clay loam or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 25 percent—0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

2Bt3 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 15 to 25 percent

Content of rock fragments: 35 to 75 percent—15 to 40 percent cobbles; 20 to 35 percent pebbles

Reaction: pH 7.4 to 8.4

2Bk1 horizon

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Clay content: 10 to 18 percent

Content of rock fragments: 40 to 80 percent—15 to 40 percent cobbles; 25 to 40 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

2Bk2 horizon

Texture: Sand, loamy sand, or loamy coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 80 percent—10 to 30 percent cobbles; 30 to 50 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

43A—Beavwan loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,350 to 4,650 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Beavwan and similar soils: 85 percent

Minor Components

Beaverell cobbly loam: 0 to 10 percent

Attewan loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

443A—Beavwan loam, moderately wet, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,450 to 4,700 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Beavwan and similar soils: 85 percent

Minor Components

Beaverell cobbly loam: 0 to 10 percent

Attewan clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 4.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Beehive Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Moderately rapid

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 8 percent

Elevation range: 5,300 to 6,650 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Sandy-skeletal, mixed Oxyaquic Cryofluvents

Typical Pedon

Beehive gravelly sandy loam, in an area of Beehive-Mooseflat complex, 4 to 8 percent slopes, in an area of forest land, 2,600 feet north and 400 feet west of the southeast corner of sec. 34, T. 6 S., R. 3 E.

Oi—0 to 2 inches; slightly decomposed forest litter consisting of bark, needles, and twigs.

A—2 to 5 inches; grayish brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few coarse roots; 10 percent cobbles and 20 percent pebbles; slightly acid; clear smooth boundary.

C1—5 to 20 inches; variegated extremely gravelly loamy coarse sand; massive; loose, nonsticky, and nonplastic; common very fine and few medium and coarse roots; 20 percent cobbles and 50 percent pebbles; slightly acid; clear wavy boundary.

C2—20 to 28 inches; grayish brown (10YR 5/2) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 15 percent cobbles and 35 percent pebbles; slightly acid; clear wavy boundary.

C3—28 to 60 inches; variegated extremely cobbly loamy sand; massive; loose, nonsticky, and nonplastic; few very fine and medium roots; 40 percent cobbles and 35 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 12 and 35 inches

Depth to seasonal high water table: 24 to 42 inches

A horizon

Value: 3 or 4 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 35 percent—5 to 10 percent cobbles; 10 to 25 percent pebbles

Reaction: pH 6.1 to 7.8

C1 and C2 horizons

Hue: 10YR or variegated

Value: 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Loamy coarse sand, loamy sand, or sandy loam

Clay content: 5 to 20 percent

Content of rock fragments: 40 to 70 percent—10 to 20 percent cobbles; 30 to 50 percent pebbles

Reaction: pH 6.1 to 7.8

C3 horizon

Hue: 10YR or variegated

Value: 3 or 4 moist; 5 dry

Chroma: 2, 3, or 4

Texture: Loamy coarse sand, loamy sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 50 to 80 percent—30 to 40 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

608B—Beehive-Mooseflat complex, 0 to 4 percent slopes

Setting

Landform:

- Beehive—Flood plains
- Mooseflat—Flood plains

Slope:

- Beehive—0 to 4 percent
- Mooseflat—0 to 4 percent

Elevation: 5,300 to 6,650 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Beehive and similar soils: 60 percent

Mooseflat and similar soils: 30 percent

Minor Components

Soils with a water table at 4 to 6 feet: 0 to 8 percent

Water: 0 to 2 percent

Major Component Description

Beehive

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Forest land

Flooding: Occasional

Water table: Apparent

Available water capacity: Mainly 2.2 inches

Mooseflat

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Water table: Apparent

Available water capacity: Mainly 4.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

608D—Beehive-Mooseflat complex, 4 to 8 percent slopes

Setting

Landform:

- Beehive—Flood plains
- Mooseflat—Flood plains

Slope:

- Beehive—4 to 8 percent
- Mooseflat—4 to 8 percent

Elevation: 5,300 to 6,600 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Beehive and similar soils: 60 percent

Mooseflat and similar soils: 30 percent

Minor Components

Soils with a water table at 4 to 6 feet: 0 to 8 percent

Water: 0 to 2 percent

Major Component Description

Beehive

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Forest land

Flooding: Occasional

Water table: Apparent

Available water capacity: Mainly 2.2 inches

Mooseflat

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Water table: Apparent

Available water capacity: Mainly 4.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Beenom Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Hills

Parent material: Argillite or igneous residuum

Slope range: 4 to 60 percent

Elevation range: 4,400 to 6,500 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy, mixed, superactive, frigid
Aridic Lithic Argiustolls

Typical Pedon

Beenom loam, 4 to 15 percent slopes, in an area of forest land, 200 feet south and 2,800 feet east of the northwest corner of sec. 19, T. 5 N., R. 5 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, friable, slightly sticky, and slightly plastic; many very fine and fine and common medium roots; common very fine and fine pores; 5 percent cobbles and 5 percent channers; slightly acid; clear smooth boundary.

Bt1—6 to 11 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; common very fine and fine pores; many distinct clay films on faces of peds; 5 percent cobbles and 5 percent channers; slightly acid; clear smooth boundary.

Bt2—11 to 15 inches; brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common very fine and fine pores; many distinct clay films on faces of peds; 5 percent cobbles and 10 percent channers; slightly acid; clear smooth boundary.

BC—15 to 18 inches; reddish brown (2.5YR 4/4) very cobbly clay loam, dark reddish brown (2.5YR 3/4) moist; weak medium prismatic structure; soft, friable, moderately sticky, and moderately plastic; few fine roots; many very fine and fine pores; 20 percent cobbles and 15 percent channers; moderately acid; abrupt smooth boundary.

R—18 inches; argillite bedrock.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 15 inches

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 10 percent pebbles or channers

Reaction: pH 6.1 to 7.3

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 15 percent cobbles; 0 to 15 percent pebbles or channers

Reaction: pH 6.1 to 7.3

BC horizon

Hue: 2.5YR, 5YR, 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 30 to 60 percent—15 to 30 percent cobbles; 15 to 30 percent pebbles or channers

Reaction: pH 5.6 to 6.5

Note: Some pedons may lack a BC horizon.

**988F—Beenom, stony, moist-
Rock outcrop complex,
35 to 60 percent slopes**

Setting

Landform:

- Beenom—Hills
- Rock outcrop—Hills

Slope: 35 to 60 percent

Elevation: 4,400 to 5,600 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beenom and similar soils: 70 percent

Rock outcrop: 20 percent

Minor Components

Absarook loam: 0 to 5 percent

Tolbert stony loam: 0 to 3 percent

Cabba loam: 0 to 2 percent

Major Component Description

Beenom

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Igneous residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.8 inches

Rock outcrop

Definition: Exposures of igneous bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**970D—Beenom loam,
4 to 15 percent slopes**

Setting

Landform: Hills

Slope: 4 to 15 percent

Elevation: 5,700 to 6,500 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beenom and similar soils: 90 percent

Minor Components

Absarook loam: 0 to 5 percent

Tolbert channery loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**970F—Beenom, stony-Rock outcrop
complex, 15 to 60 percent slopes**

Setting

Landform:

- Beenom—Hills
- Rock outcrop—Hills

Slope: 15 to 60 percent

Elevation: 4,600 to 6,300 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Beenom and similar soils: 50 percent

Rock outcrop: 40 percent

Minor Components

Absarook sandy loam: 0 to 5 percent

Anceney cobbly loam: 0 to 5 percent

Major Component Description

Beenom

Surface layer texture: Cobbly sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Igneous residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.6 inches

Rock outcrop

Definition: Exposures of igneous bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bielenberg Series

Depth class: Deep

Drainage class: Well drained

Permeability: Moderate

Landform: Hills and bedrock-floored plains

Parent material: Gneiss or schist residuum

Slope range: 4 to 45 percent

Elevation range: 4,400 to 6,650 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Bielenberg sandy clay loam, in an area of Bielenberg-Catgulch, very stony complex, 4 to 15 percent slopes, in an area of rangeland, 800 feet south and 1,200 feet east of the northwest corner of sec. 31, T. 2 S., R. 4 E.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, and slightly plastic; common very fine, fine, and medium roots; 5 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bt1—9 to 20 inches; brown (10YR 4/3) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bt2—20 to 29 inches; brown (10YR 5/3) gravelly sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common

distinct clay films on faces of peds; 5 percent cobbles and 15 percent pebbles; neutral; clear smooth boundary.

C—29 to 43 inches; brown (10YR 5/3) very gravelly coarse sandy loam, brown (10YR 4/3) moist; massive; loose, nonsticky, and nonplastic; few very fine and fine roots; 5 percent cobbles and 35 percent pebbles; neutral; clear wavy boundary.

Cr—43 to 58 inches; highly weathered gneiss bedrock.

R—58 inches; hard gneiss bedrock.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to bedrock: 40 to 60 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 30 percent—0 to 5 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

C horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Sandy loam or coarse sandy loam

Clay content: 12 to 20 percent

Content of rock fragments: 15 to 50 percent—0 to 10 percent cobbles; 15 to 40 percent pebbles

Reaction: pH 6.1 to 7.3

454D—Bielenberg-Catgulch, very stony complex, 4 to 15 percent slopes**Setting***Landform:*

- Bielenberg—Hills
- Catgulch—Hills

Slope:

- Bielenberg—4 to 15 percent
- Catgulch—4 to 15 percent

Elevation: 4,650 to 5,750 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Bielenberg and similar soils: 75 percent

Catgulch and similar soils: 15 percent

Minor Components

Breeton coarse sandy loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Bielenberg***Surface layer texture:* Sandy clay loam*Depth class:* Deep (40 to 60 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.4 inches**Catgulch***Surface layer texture:* Very cobbly coarse sandy loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

454E—Bielenberg-Catgulch, very stony-Breeton complex, 15 to 45 percent slopes**Setting***Landform:*

- Bielenberg—Hills
- Catgulch—Hills
- Breeton—Hills

Slope:

- Bielenberg—15 to 45 percent
- Catgulch—15 to 45 percent
- Breeton—15 to 35 percent

Elevation: 4,400 to 6,400 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Bielenberg and similar soils: 40 percent

Catgulch and similar soils: 35 percent

Breeton and similar soils: 10 percent

Minor Components

Clasol soil: 0 to 7 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Rock outcrop: 0 to 3 percent

Major Component Description**Bielenberg***Surface layer texture:* Sandy clay loam*Depth class:* Deep (40 to 60 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 5.4 inches**Catgulch***Surface layer texture:* Very cobbly coarse sandy loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.1 inches**Breeton***Surface layer texture:* Coarse sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bigbear Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Relict stream terraces, escarpments, and hills

Parent material: Alluvium or colluvium

Slope range: 0 to 45 percent

Elevation range: 4,700 to 6,300 feet

Annual precipitation: 18 to 22 inches

Annual air temperature: 37 to 41 degrees F

Frost-free period: 80 to 95 days

Taxonomic Class: Fine, mixed, superactive, frigid
Typic Argiustolls

Typical Pedon

Bigbear loam, 8 to 15 percent slopes, in an area of hayland, 800 feet south and 2,500 feet west of the northeast corner of sec. 4, T. 3 S., R. 6 E.

A—0 to 9 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to strong fine granular; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—9 to 13 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to strong fine granular; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and few fine and medium roots; common distinct clay films on faces of peds and lining pores; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt2—13 to 35 inches; yellowish brown (10YR 5/4) gravelly clay, dark yellowish brown (10YR 4/4) moist, moderate medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, moderately sticky, and very plastic; few very fine roots; many prominent clay films on faces of peds and lining pores; 5 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bk—35 to 60 inches; yellowish brown (10YR 5/6) very cobbly sandy clay loam, dark yellowish brown (10YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; 5 percent stones, 20 percent cobbles, and 15 percent pebbles; common large masses of lime; violently effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 15 inches

Depth to the Bk horizon: 20 to 40 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizons

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 30 percent—0 to 10 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizon

Value: 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 3, 4, 5, or 6

Texture: Clay loam, sandy clay loam, or loam

Clay content: 25 to 40 percent

Content of rock fragments: 15 to 45 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 10 to 25 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

65E—Bigbear clay loam, 15 to 35 percent slopes

Setting

Landform: Escarpments
Slope: 15 to 35 percent
Elevation: 4,800 to 6,150 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Bigbear and similar soils: 85 percent

Minor Components

Burnel loam: 0 to 5 percent
 Storyhill cobbly loam: 0 to 5 percent
 Bigbear stony loam: 0 to 3 percent
 Soils with slopes more than 35 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

65B—Bigbear loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Elevation: 5,500 to 6,100 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Bigbear and similar soils: 90 percent

Minor Components

Soils with slopes more than 4 percent: 0 to 5 percent
 Storyhill cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

65C—Bigbear loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces
Slope: 4 to 8 percent
Elevation: 4,700 to 6,000 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Bigbear and similar soils: 90 percent

Minor Components

Bigbear cobbly loam: 0 to 5 percent
 Burnel loam: 0 to 3 percent
 Storyhill cobbly loam: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

65D—Bigbear loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces

Slope: 8 to 15 percent

Elevation: 4,800 to 6,300 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Bigbear and similar soils: 90 percent

Minor Components

Bigbear cobbly loam: 0 to 5 percent

Burnel loam: 0 to 3 percent

Storyhill cobbly loam: 0 to 2 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

365D—Bigbear, stony-Storyhill, very stony complex, 4 to 15 percent slopes

Setting

Landform:

- Bigbear—Hills

- Storyhill—Hills

Slope:

- Bigbear—4 to 15 percent

- Storyhill—4 to 15 percent

Elevation: 5,350 to 6,100 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Bigbear and similar soils: 65 percent

Storyhill and similar soils: 25 percent

Minor Components

Bowery loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Bigbear

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.5 inches

Storyhill

Surface layer texture: Very cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

665E—Bigbear-Storyhill-Adel complex, 15 to 45 percent slopes

Setting

Landform:

- Bigbear—Hills

- Storyhill—Hills

- Adel—Hills

Slope:

- Bigbear—15 to 45 percent

- Storyhill—15 to 45 percent

- Adel—15 to 45 percent

Elevation: 4,750 to 5,950 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 65 to 95 days

Composition

Major Components

Bigbear and similar soils: 40 percent
 Storyhill and similar soils: 25 percent
 Adel and similar soils: 20 percent

Minor Components

Bigbear stony loam: 0 to 10 percent
 Soils with slopes more than 45 percent: 0 to 5 percent

Major Component Description

Bigbear

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.0 inches

Storyhill

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.1 inches

Adel

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bigsandy Series

Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation range: 3,950 to 4,350 feet

Annual precipitation: 10 to 14 inches
Annual air temperature: 41 to 44 degrees F
Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, calcareous, frigid Typic Fluvaquents

Typical Pedon

Bigsandy silty clay loam, in an area of Bigsandy-Slickspots complex, 0 to 2 percent slopes, in an area of rangeland, 200 feet south and 2,200 feet east of the northwest corner of sec. 28, T. 1 N., R. 2 E.

- A—0 to 3 inches; dark gray (10YR 4/1) silty clay loam, gray (10YR 5/1) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine, fine, and medium roots; violently effervescent; very strongly alkaline; clear smooth boundary.
- C1—3 to 9 inches; grayish brown (10YR 5/2) silty clay loam, gray (10YR 6/1) dry; weak medium subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; violently effervescent; very strongly alkaline; clear smooth boundary.
- C2—9 to 17 inches; dark gray (10YR 4/1) silty clay loam, gray (10YR 6/1) dry; silty clay loam; massive; hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; violently effervescent; strongly alkaline; clear smooth boundary.
- Cg1—17 to 35 inches; gray (10YR 5/1) silty clay loam, gray (10YR 6/1) dry; massive; extremely hard, firm, slightly sticky, and slightly plastic; few very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.
- Cg2—35 to 60 inches; dark gray (10YR 4/1) silt loam, gray (10YR 5/1) dry; massive; extremely hard, firm, slightly sticky, and slightly plastic; few very fine roots; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Depth to seasonal high water table: 12 to 24 inches

A horizon

Hue: 10YR or 2.5Y
 Value: 3 or 4 moist; 4, 5, or 6 dry
 Chroma: 1 or 2
 Clay content: 27 to 35 percent
 Electrical conductivity (mmhos/cm): 4 to 8
 Sodium adsorption ratio: 13 to 30
 Calcium carbonate equivalent: 20 to 40 percent
 Reaction: pH 7.9 to 9.6

C horizons

Hue: 10YR or 2.5Y
 Value: 4 or 5 moist; 5 or 6 dry
 Chroma: 1 or 2
 Texture: Silty clay loam, clay loam, silt loam, or loam
 Clay content: 18 to 35 percent
 Electrical conductivity (mmhos/cm): 4 to 8
 Sodium adsorption ratio: 13 to 30
 Calcium carbonate equivalent: 40 to 55 percent
 Reaction: pH 7.9 to 9.6

Cg horizons

Hue: 10YR, 2.5Y, or 5Y
 Value: 4 or 5 moist; 5 or 6 dry
 Chroma: 1 or 2
 Texture: Silty clay loam, loam, clay loam, or silt loam
 Clay content: 18 to 35 percent
 Electrical conductivity (mmhos/cm): 4 to 8
 Sodium adsorption ratio: 4 to 20
 Calcium carbonate equivalent: 25 to 50 percent
 Reaction: pH 7.9 to 9.0

Note: The Bigsandy soil as mapped in Gallatin County is a taxadjunct to the series. It has carbonatic mineralogy.

544A—Bigsandy-Slickspots complex, 0 to 2 percent slopes

Setting

Landform:

- Bigsandy—Stream terraces
- Slickspots—Stream terraces

Slope: 0 to 2 percent

Elevation: 3,950 to 4,350 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Bigsandy and similar soils: 60 percent

Slickspots: 25 percent

Minor Components

Threeriv loam: 0 to 10 percent

Greycliff loam: 0 to 5 percent

Major Component Description

Bigsandy

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Salt affected: Saline within 30 inches

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 6.3 inches

Slickspots

Definition: A small area of loamy or clayey soil with a crusted surface, an excess of sodium, and supporting little or no vegetation.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Billman Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Sedimentary plains and hills

Parent material: Interbedded sandstone and shale residuum

Slope range: 2 to 60 percent

Elevation range: 4,900 to 6,900 feet

Annual precipitation: 17 to 22 inches

Annual air temperature: 37 to 41 degrees F

Frost-free period: 80 to 100 days

Taxonomic Class: Fine, mixed, superactive, frigid
Typic Argiustolls

Typical Pedon

Billman clay loam, in an area of Billman-Wilsall-Tolbert complex, 8 to 45 percent slopes, in an area of hayland, 2,200 feet north and 2,200 feet west of the southeast corner of sec. 11, T. 2 S., R. 6 E.

A—0 to 7 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent pebbles; neutral; clear wavy boundary.

Bt1—7 to 15 inches; brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate medium prismatic structure; very hard, firm, moderately sticky, and moderately plastic; common very fine

and fine roots and few medium roots; common distinct clay films on faces of pedis and lining pores; 5 percent pebbles; neutral; clear wavy boundary.

Bt2—15 to 23 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; strong medium subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common distinct clay films on faces of pedis and lining pores; 5 percent pebbles; neutral; clear wavy boundary.

Cr1—23 to 38 inches; brown (7.5YR 4/2) moist; semiconsolidated shale that textures to silty clay loam; neutral.

Cr2—38 to 60 inches; dark gray (5YR 4/1) moist; semiconsolidated shale.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 16 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 2.5Y, 5YR, 7.5YR, or 10YR

Value: 2 or 3 moist

Chroma: 1 or 2

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 7.5YR, 5YR, or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam, clay, silty clay loam, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles or flagstones; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

Bt2 horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, clay, silty clay loam, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

660F—Billman, stony-Bangtail-Tolbert, stony complex, 25 to 60 percent slopes

Setting

Landform:

- Billman—Hills, south aspects
- Bangtail—Hills, north aspects
- Tolbert—Hills, south aspects

Slope:

- Billman—25 to 60 percent
- Bangtail—25 to 60 percent
- Tolbert—25 to 60 percent

Elevation: 4,900 to 6,900 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Billman and similar soils: 40 percent

Bangtail and similar soils: 30 percent

Tolbert and similar soils: 15 percent

Minor Components

Adel loam: 0 to 8 percent

Timberlin loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Billman

Surface layer texture: Cobbly clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.8 inches

Bangtail

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.8 inches

Tolbert

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

860F—Billman-Adel-Tolbert complex, 25 to 60 percent slopes

Setting

Landform:

- Billman—Hills
- Adel—Hills
- Tolbert—Hills

Slope:

- Billman—25 to 45 percent
- Adel—25 to 45 percent
- Tolbert—25 to 60 percent

Elevation: 5,350 to 6,550 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Billman and similar soils: 50 percent

Adel and similar soils: 25 percent

Tolbert and similar soils: 15 percent

Minor Components

Bridger loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Billman

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.0 inches

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.3 inches

Tolbert

Surface layer texture: Very channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

760C—Billman-Wilsall clay loams, 2 to 8 percent slopes

Setting

Landform:

- Billman—Sedimentary plains
- Wilsall—Sedimentary plains

Slope:

- Billman—2 to 8 percent
- Wilsall—2 to 8 percent

Elevation: 5,300 to 6,200 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Billman and similar soils: 60 percent

Wilsall and similar soils: 30 percent

Minor Components

Burnel clay loam: 0 to 5 percent

Tolbert channery loam: 0 to 5 percent

Major Component Description

Billman

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.0 inches

Wilsall

Surface layer texture: Clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

760E—Billman-Wilsall clay loams, 8 to 25 percent slopes

Setting

Landform:

- Billman—Hills
- Wilsall—Hills

Slope:

- Billman—8 to 25 percent
- Wilsall—8 to 25 percent

Elevation: 4,950 to 6,250 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Billman and similar soils: 50 percent

Wilsall and similar soils: 40 percent

Minor Components

Tolbert channery loam: 0 to 5 percent

Burnel clay loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Billman

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.0 inches

Wilsall

Surface layer texture: Clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

960E—Billman-Wilsall-Tolbert complex, 8 to 45 percent slopes

Setting

Landform:

- Billman—Hills
- Wilsall—Hills
- Tolbert—Hills

Slope:

- Billman—8 to 45 percent
- Wilsall—8 to 45 percent
- Tolbert—8 to 45 percent

Elevation: 4,950 to 6,300 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Billman and similar soils: 50 percent

Wilsall and similar soils: 20 percent

Tolbert and similar soils: 20 percent

Minor Components

Burnel loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Billman

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.0 inches

Wilsall

Surface layer texture: Clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

Tolbert

Surface layer texture: Very channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Binna Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate above 30 inches and rapid below

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,150 to 4,550 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Aridic Calciustolls

Typical Pedon

Binna loam, in an area of Binna-Slickspots complex, moderately wet, 0 to 2 percent slopes, in an area of pasture, 700 feet north and 400 feet east of the southwest corner of sec. 9, T. 1 S., R. 2 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; 5 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

Bw—8 to 15 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—15 to 26 inches; light gray (10YR 7/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; few very fine and fine roots; 5 percent pebbles; common medium masses and seams of lime; violently effervescent, moderately alkaline; clear smooth boundary.

2Bk2—26 to 30 inches; light gray (10YR 7/2) very cobbly sandy clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine and fine roots; 30 percent cobbles and 25 percent pebbles; common medium masses and seams of lime; violently effervescent; strongly alkaline; clear smooth boundary.

2C—30 to 60 inches; variegated extremely cobbly loamy coarse sand; massive; loose, nonsticky, and nonplastic; 35 percent cobbles and 30 percent pebbles; slightly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 8

Reaction: pH 7.4 to 8.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Chroma: 2 or 3

Texture: Loam or clay loam
 Clay content: 18 to 30 percent
 Content of rock fragments: 0 to 10 percent pebbles
 Reaction: pH 7.4 to 8.4

Bk1 horizon

Hue: 10YR or 2.5Y
 Value: 7 or 8 dry; 4, 5, or 6 moist
 Chroma: 2 or 3
 Texture: Loam, silt loam, sandy loam, or sandy clay loam
 Clay content: 18 to 27 percent
 Content of rock fragments: 0 to 10 percent pebbles
 Calcium carbonate equivalent: 15 to 30 percent
 Reaction: pH 7.9 to 9.0

2Bk2 horizon

Hue: 10YR, 2.5Y, or variegated
 Value: 6, 7, or 8 dry; 4, 5, or 6 moist
 Chroma: 2 or 3
 Texture: Loam, silt loam, sandy loam, or sandy clay loam
 Clay content: 18 to 27 percent
 Content of rock fragments: 35 to 80 percent—25 to 35 percent cobbles; 20 to 60 percent pebbles
 Calcium carbonate equivalent: 15 to 35 percent
 Reaction: pH 7.9 to 9.0

2C horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 5 or 6 moist
 Texture: Loamy sand, sand, or loamy coarse sand
 Clay content: 5 to 10 percent
 Content of rock fragments: 35 to 80 percent—5 to 35 percent cobbles; 30 to 45 percent pebbles
 Calcium carbonate equivalent: 5 to 10 percent
 Reaction: pH 7.4 to 8.4

516A—Binna loam, 0 to 2 percent slopes**Setting**

Landform: Stream terraces
Slope: 0 to 2 percent
Elevation: 4,150 to 4,550 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition**Major Components**

Binna and similar soils: 85 percent

Minor Components

Lamoose loam: 0 to 10 percent
 Rivra gravelly sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Salt affected: Saline within 30 inches
Available water capacity: Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

527A—Binna-Slickspots complex, moderately wet, 0 to 2 percent slopes**Setting**

Landform:
 • Binna—Stream terraces
 • Slickspots—Stream terraces
Slope: 0 to 2 percent
Elevation: 4,200 to 4,300 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition**Major Components**

Binna and similar soils: 75 percent
 Slickspots: 15 percent

Minor Components

Beaverell cobbly loam: 0 to 5 percent
 Binna clay loam: 0 to 5 percent

Major Component Description**Binna**

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Available water capacity: Mainly 6.9 inches

Slickspots

Definition: A small area of loamy or clayey soil with a crusted surface, an excess of sodium, and supporting little or no vegetation.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Birney Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Alluvial fans and stream terraces

Parent material: Alluvium

Slope range: 0 to 15 percent

Elevation range: 4,000 to 5,050 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 43 to 45 degrees F

Frost-free period: 100 to 120 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Aridic Haplustepts

Typical Pedon

Birney loam, 2 to 8 percent slopes, in an area of rangeland, 900 feet east and 800 feet north of the southwest corner of sec. 5, T. 3 N., R. 3 E.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; moderately alkaline; clear smooth boundary.

Bw—4 to 11 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist, moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk1—11 to 20 inches; pale brown (10YR 6/3) very channery sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; common very fine and fine roots; 25 percent channers and 15 percent pebbles; common distinct lime coatings on rock fragments; few lime pendants on undersides of rock fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—20 to 60 inches; pale brown (10YR 6/3) very channery sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very

friable, slightly sticky, and nonplastic; few very fine roots; 35 percent channers and 15 percent pebbles; common distinct lime coatings on rock fragments and many lime pendants on undersides of rock fragments; violently effervescent; strongly alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Depth to the Bk horizon: 10 to 15 inches

A horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Loam or sandy loam

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles or channers

Reaction: pH 7.9 to 8.4

Bw horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 2, 3, 4, or 6

Texture: Loam or sandy loam

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 25 percent pebbles or channers

Reaction: pH 7.9 to 8.4

Bk horizons

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, 4, or 6

Texture: Sandy loam or loam

Clay content: 15 to 27 percent

Content of rock fragments: 35 to 70 percent pebbles or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

128D—Birney channery loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 8 to 15 percent

Elevation: 4,000 to 4,900 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 100 to 120 days

Composition

Major Components

Birney and similar soils: 85 percent

Minor Components

Amesha loam: 0 to 5 percent

Birney very channery loam: 0 to 5 percent

Trimad cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Channery loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

28C—Birney loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 2 to 8 percent

Elevation: 4,000 to 5,000 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 100 to 120 days

Composition

Major Components

Birney and similar soils: 90 percent

Minor Components

Amesha loam: 0 to 5 percent

Busby loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Blackdog Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Relict stream terraces

Parent material: Loess

Slope range: 0 to 15 percent

Elevation range: 4,350 to 5,800 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-silty, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Blackdog silt loam, 0 to 4 percent slopes, in an area of cropland, 850 feet south and 1,500 feet east of the northwest corner of sec. 26, T. 1 N., R. 5 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; neutral; clear smooth boundary.

A2—6 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and moderately plastic; few very fine roots; neutral; clear smooth boundary.

Bt1—10 to 14 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, moderately sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of ped and lining pores; slightly alkaline; clear smooth boundary.

Bt2—14 to 19 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; hard, friable, moderately sticky, and moderately plastic; few very fine roots; common faint clay films on faces of ped and lining pores; slightly alkaline; abrupt smooth boundary.

Bk1—19 to 26 inches; pale brown (10YR 6/3) silt loam, dark yellowish brown (10YR 4/4) moist;

weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common fine threads and seams of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—26 to 60 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the Bk horizon: 18 to 30 inches

A horizon

Value: 3, 4, or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Reaction: pH 6.6 to 7.3

Bt1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Reaction: pH 6.6 to 7.8

Bt2 horizon

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Reaction: pH 6.6 to 7.8

Note: Some pedons contain a Bt3 horizon with silt loam textures.

Bk horizons

Value: 6 or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Clay content: 15 to 25 percent

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

50B—Blackdog silt loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces

Slope: 0 to 4 percent

Elevation: 4,350 to 5,500 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Blackdog and similar soils: 90 percent

Minor Components

Meagher loam: 0 to 4 percent

Bowery loam: 0 to 3 percent

Quagle silt loam: 0 to 3 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

50C—Blackdog silt loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces

Slope: 4 to 8 percent

Elevation: 4,500 to 5,750 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Blackdog and similar soils: 90 percent

Minor Components

Meagher cobbly loam: 0 to 4 percent

Bowery loam: 0 to 3 percent

Quagle silt loam: 0 to 3 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

50D—Blackdog silt loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces

Slope: 8 to 15 percent

Elevation: 4,500 to 5,700 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Blackdog and similar soils: 85 percent

Minor Components

Bowery loam: 0 to 5 percent

Quagle silt loam: 0 to 5 percent

Meagher cobbly loam: 0 to 3 percent

Beanlake loam: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

450B—Blackdog-Quagle silt loams, 0 to 4 percent slopes

Setting

Landform:

- Blackdog—Relict stream terraces
- Quagle—Relict stream terraces

Slope:

- Blackdog—0 to 4 percent
- Quagle—0 to 4 percent

Elevation: 4,500 to 5,400 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Blackdog and similar soils: 60 percent

Quagle and similar soils: 30 percent

Minor Components

Beanlake loam: 0 to 5 percent

Bowery loam: 0 to 5 percent

Major Component Description

Blackdog

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

Quagle

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

450C—Blackdog-Quagle silt loams, 4 to 8 percent slopes

Setting

Landform:

- Blackdog—Relict stream terraces
- Quagle—Relict stream terraces

Slope:

- Blackdog—4 to 8 percent
- Quagle—4 to 8 percent

Elevation: 4,400 to 5,500 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Blackdog and similar soils: 60 percent
Quagle and similar soils: 30 percent

Minor Components

Beanlake loam: 0 to 5 percent
Bowery loam: 0 to 3 percent
Anceney cobbly loam: 0 to 2 percent

Major Component Description

Blackdog

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.9 inches

Quagle

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

450D—Blackdog-Brodyk silt loams, 8 to 15 percent slopes

Setting

Landform:

- Blackdog—Relict stream terraces
- Brodyk—Relict stream terraces

Slope:

- Blackdog—8 to 15 percent
- Brodyk—8 to 15 percent

Elevation: 4,500 to 5,800 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Blackdog and similar soils: 55 percent
Brodyk and similar soils: 35 percent

Minor Components

Beanlake loam: 0 to 5 percent
Bowery loam: 0 to 3 percent
Anceney cobbly loam: 0 to 2 percent

Major Component Description

Blackdog

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.9 inches

Brodyk

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Blackmore Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Relict stream terraces

Parent material: Loess

Slope range: 0 to 15 percent

Elevation range: 4,700 to 5,600 feet

Annual precipitation: 18 to 22 inches

Annual air temperature: 37 to 41 degrees F

Frost-free period: 80 to 95 days

Taxonomic Class: Fine-silty, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Blackmore silt loam, 4 to 8 percent slopes, in an area of hayland, 1,100 feet south and 1,800 feet west of the northeast corner of sec. 27, T. 2 S., R. 6 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silt loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and common fine and medium roots; slightly acid; abrupt smooth boundary.

AB—6 to 10 inches; very dark gray (10YR 3/1) silt loam, black (10YR 2/1) moist; moderate fine and medium angular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and common fine and medium roots; neutral; abrupt wavy boundary.

Bt1—10 to 15 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist, with some very dark gray (10YR 3/1) moist, interfingering of mollic material; strong fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine and few fine and medium roots; common distinct clay films on faces of peds and lining pores; neutral; gradual smooth boundary.

Bt2—15 to 27 inches; yellowish brown (10YR 5/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and slightly plastic; common very fine and few fine and medium roots; common distinct clay films on faces of peds and lining pores; neutral; clear smooth boundary.

Bk1—27 to 42 inches; pale brown (10YR 6/3) silt loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, firm, moderately sticky, and slightly plastic; few fine roots; many fine threads and seams of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—42 to 60 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; common medium masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 15 inches

Depth to the Bk horizon: 20 to 40 inches

Ap and AB horizons

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 22 to 27 percent

Reaction: pH 6.1 to 7.3

Bt horizons

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Reaction: pH 6.1 to 7.3

Bk1 horizon

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 3, 4, or 6

Texture: Silt loam or silty clay loam

Clay content: 15 to 30 percent

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

Bk2 horizon

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 3, 4, or 6

Texture: Silt loam or silty clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.4 to 8.4

350B—Blackmore silt loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces

Slope: 0 to 4 percent

Elevation: 4,850 to 5,550 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Blackmore and similar soils: 90 percent

Minor Components

Bowery loam: 0 to 5 percent

Soils with slopes more than 4 percent: 0 to 3 percent

Brodyk silt loam: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

350C—Blackmore silt loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces
Slope: 4 to 8 percent
Elevation: 4,750 to 5,600 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Blackmore and similar soils: 90 percent

Minor Components

Bowery loam: 0 to 4 percent
 Brodyk silt loam: 0 to 3 percent
 Doughty cobbly loam: 0 to 3 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

350D—Blackmore silt loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces
Slope: 8 to 15 percent
Elevation: 4,700 to 5,550 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Blackmore and similar soils: 90 percent

Minor Components

Bowery loam: 0 to 5 percent
 Doughty cobbly loam: 0 to 3 percent
 Brodyk silt loam: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Blacksheep Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Escarpments
Parent material: Semiconsolidated, sandy sedimentary beds
Slope range: 15 to 45 percent
Elevation range: 3,950 to 5,400 feet
Annual precipitation: 10 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 95 to 115 days

Taxonomic Class: Loamy, mixed, superactive, calcareous, frigid, shallow Aridic Ustorthents

Typical Pedon

Blacksheep cobbly sandy loam in an area of Blacksheep-Kalsted-Scravo complex, 15 to 45 percent slopes, in an area of rangeland, 1,100 feet north and 1,000 feet east of the southwest corner of sec. 7, T. 1 S., R. 2 E.

A—0 to 6 inches; light brownish gray (10YR 6/2) cobbly sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and nonplastic; many very fine and fine and few medium roots; common very fine continuous irregular pores; 15 percent cobbles and 15 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

C—6 to 16 inches; light gray (10YR 7/2) sandy loam, brown (10YR 5/3) moist; massive; soft, loose, nonsticky, and nonplastic; common very fine and fine and few medium roots; common very fine continuous irregular pores; 5 percent cobbles and 5 percent pebbles; strongly effervescent; moderately alkaline; gradual irregular boundary.

Cr—16 to 60 inches; semiconsolidated, calcareous sandstone.

Range in Characteristics

Soil temperature: 43 to 47 inches

Moisture control section: Between 8 and 16 inches

A horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 5 to 15 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 7.4 to 8.4

C horizon

Hue: 2.5Y, 10YR, or 7.5YR

Value: 5, 6, or 7 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Fine sandy loam, sandy loam, or very fine sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 7.9 to 9.0

Note: Some pedons may contain a Bk horizon.

811E—Blacksheep, moist-Kalsted-Scravo complex, 15 to 45 percent slopes

Setting

Landform:

- Blacksheep—Escarpments
- Kalsted—Escarpments
- Scravo—Escarpments

Slope:

- Blacksheep—15 to 45 percent
- Kalsted—15 to 45 percent
- Scravo—15 to 45 percent

Elevation: 4,000 to 5,400 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Blacksheep and similar soils: 50 percent

Kalsted and similar soils: 20 percent

Scravo and similar soils: 20 percent

Minor Components

Rock outcrop: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 5 percent

Major Component Description

Blacksheep

Surface layer texture: Cobbly sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.0 inches

Kalsted

Surface layer texture: Sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.9 inches

Scravo

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

410E—Blacksheep-Chinook-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Blacksheep—Escarpments
- Chinook—Escarpments
- Rock outcrop—Escarpments

Slope:

- Blacksheep—15 to 45 percent
- Chinook—15 to 35 percent

Elevation: 4,200 to 5,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Blacksheep and similar soils: 45 percent

Chinook and similar soils: 30 percent

Rock outcrop: 15 percent

Minor Components

Kalsted sandy loam: 0 to 5 percent

Scravo cobbly sandy loam: 0 to 5 percent

Major Component Description

Blacksheep

Surface layer texture: Sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.1 inches

Chinook

Surface layer texture: Sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

Rock outcrop

Definition: Exposures of sandy sedimentary bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

711E—Blacksheep-Kalsted-Scravo complex, 15 to 45 percent slopes

Setting

Landform:

- Blacksheep—Escarpments
- Kalsted—Escarpments
- Scravo—Escarpments

Slope:

- Blacksheep—15 to 45 percent
- Kalsted—15 to 45 percent
- Scravo—15 to 45 percent

Elevation: 3,950 to 5,250 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Blacksheep and similar soils: 45 percent

Kalsted and similar soils: 25 percent

Scravo and similar soils: 20 percent

Minor Components

Rock outcrop: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 5 percent

Major Component Description

Blacksheep

Surface layer texture: Cobbly sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, sandy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.0 inches

Kalsted

Surface layer texture: Sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.9 inches

Scravo

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Blaincreek Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Hills

Parent material: Argillite residuum

Slope range: 2 to 70 percent

Elevation range: 4,400 to 6,600 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Blaincreek loam, in an area of Tolbert-Blaincreek-Adel complex, 15 to 45 percent slopes, in an area of rangeland, 1,700 feet south and 1,000 feet west of the northeast corner of sec. 14, T. 3 N., R. 3 E.

A—0 to 5 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; moderate medium granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and common medium roots; 5 percent flagstones and 10 percent channers; neutral; clear wavy boundary.

Bt1—5 to 10 inches; dark grayish brown (10YR 4/2) channery clay loam, very dark grayish brown (10YR 3/2) moist; weak, medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent flagstones and 30 percent channers; neutral; clear wavy boundary.

Bt2—10 to 15 inches; brown (10YR 5/3) very channery clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds; 10 percent flagstones and 40 percent channers; neutral; gradual wavy boundary.

Bt3—15 to 23 inches; yellowish brown (10YR 5/4) extremely channery sandy clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; common distinct clay films of faces of peds; 10 percent flagstones and 50 percent channers; neutral; gradual smooth boundary.

R—23 inches; argillite bedrock.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 15 inches

Depth to bedrock: 20 to 40 inches

A horizon

Hue: 10YR or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles or flagstones; 0 to 30 percent pebbles or channers

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 10YR or 7.5YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3
 Clay content: 27 to 35 percent
 Content of rock fragments: 30 to 60 percent—0 to 10 percent cobbles or flagstones; 30 to 50 percent pebbles or channers
 Reaction: pH 6.6 to 7.8

Bt2 horizon

Hue: 10YR or 7.5YR
 Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 or 3
 Texture: Loam or clay loam
 Clay content: 20 to 35 percent
 Content of rock fragments: 35 to 60 percent—5 to 10 percent flagstones; 30 to 50 percent channers
 Reaction: pH 6.6 to 7.8

Bt3 horizon

Hue: 10YR or 7.5YR
 Value: 4, 5, or 6 dry; 4 or 5 moist
 Chroma: 2, 3, or 4
 Texture: Loam, clay loam, or sandy clay loam
 Clay content: 20 to 35 percent
 Content of rock fragments: 45 to 70 percent—10 to 15 percent flagstones; 35 to 55 percent channers
 Reaction: pH 6.6 to 7.8

439G—Blaincreek-Tolbert complex, 40 to 70 percent slopes

Setting

Landform:

- Blaincreek—Hills
- Tolbert—Hills

Slope:

- Blaincreek—45 to 70 percent
- Tolbert—45 to 70 percent

Elevation: 5,000 to 6,200 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Blaincreek and similar soils: 50 percent
 Tolbert and similar soils: 40 percent

Minor Components

Adel loam: 0 to 5 percent
 Tolex and similar soils: 0 to 3 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Blaincreek

Surface layer texture: Channery loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Argillite residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.3 inches

Tolbert

Surface layer texture: Extremely channery loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Argillite residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Blossberg Series

Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderate above the 2C horizon and rapid below
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation range: 4,200 to 5,550 feet
Annual precipitation: 12 to 18 inches
Annual air temperature: 39 to 43 degrees F
Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Endoaquolls

Typical Pedon

Blossberg loam, 0 to 2 percent slopes, in an area of pasture, 2,400 feet south and 1,800 feet east of the northwest corner of sec. 20, T. 2 S., R. 5 E.

A1—0 to 2 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; soft, very friable, slightly

sticky, and slightly plastic; many very fine, fine, and medium roots; slightly alkaline; abrupt smooth boundary.

A2—2 to 10 inches; very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and common fine and medium roots; slightly alkaline; clear smooth boundary.

Bg1—10 to 15 inches; very dark grayish brown (10YR 3/2) loam, dark brown (10YR 3/3) dry; many medium prominent red (2.5YR 5/6) redox concentrations; weak fine subangular blocky structure; very hard, friable, moderately sticky, and slightly plastic; few medium roots, common fine roots, and many very fine roots; 3 percent pebbles; slightly alkaline; clear smooth boundary.

Bg2—15 to 24 inches; very dark grayish brown (10YR 3/2) sandy clay loam, dark grayish brown (10YR 4/2) dry; few fine prominent red (2.5YR 5/6) redox concentrations; weak fine subangular blocky structure; soft, friable, moderately sticky, and slightly plastic; few fine and common very fine roots; 10 percent pebbles; neutral; gradual smooth boundary.

2C—24 to 60 inches; variegated extremely gravelly loamy coarse sand; single grain; loose, nonsticky, and nonplastic; 20 percent cobbles and 40 percent pebbles; slightly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 24 inches

Depth to seasonal high water table: 12 to 24 inches

Depth to the 2C horizon: 20 to 40 inches

A horizons

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 7.4 to 7.8

Bg horizons

Hue: 2.5Y, 5Y, or 10YR

Value: 3, 4, 5, or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Loam, clay loam, or sandy clay loam

Clay content: 20 to 32 percent

Content of rock fragments: 0 to 30 percent—0 to 10 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

2C horizon

Texture: Loamy coarse sand, coarse sand, loamy sand, or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—20 to 30 percent cobbles; 15 to 50 percent pebbles

Reaction: pH 6.6 to 7.8

542A—Blossberg loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,200 to 5,550 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Blossberg and similar soils: 85 percent

Minor Components

Bonebasin loam: 0 to 10 percent

Meadowcreek loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bobkitty Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Stream terraces and flood plains

Parent material: Alluvium

Slope range: 0 to 4 percent

Elevation range: 3,950 to 5,700 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 42 to 45 degrees F

Frost-free period: 95 to 120 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Fluvaquentic Haplustolls

Typical Pedon

Bobkitty loam, in an area of Bobkitty-Bonebasin complex, 0 to 2 percent slopes, in an area of pasture, 2,100 feet south and 1,000 feet west of the northeast corner of sec. 1, T. 3 N., R. 2 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and common fine roots and few medium roots; moderately alkaline; clear smooth boundary.

C1—5 to 10 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; violently effervescent; strongly alkaline; clear smooth boundary.

C2—10 to 24 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and few fine roots; violently effervescent; very strongly alkaline; clear smooth boundary.

Cg—24 to 48 inches; light brownish gray (10YR 6/2) stratified silty clay loam and loam, dark gray (10YR 4/1) moist; common faint dark yellowish brown (10YR 4/6) moist redox concentrations; massive; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; strongly effervescent; strongly alkaline; clear smooth boundary.

2C—48 to 60 inches; light gray (10YR 7/1) stratified sandy loam and loamy sand, gray (10YR 5/1) moist; common fine and medium prominent dark yellowish brown (10YR 4/6) moist redox concentrations; single grain; soft, very friable, nonsticky, and nonplastic; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 15 inches

Depth to seasonal high water table: 24 to 42 inches

A horizon

Value: 2 or 3 moist; 4 or 5 dry

Chroma: 1 or 2

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 2 to 10 percent

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 7.9 to 8.4

C1 horizon

Value: 3 or 4 moist; 5 or 6 dry

Texture: Loam, silt loam, or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 2 to 10 percent

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 8.5 to 9.6

C2 horizon

Texture: Loam, silt loam, or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 2 to 10 percent

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 8.5 to 9.6

Cg horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 6 or 7 dry

Chroma: 1 or 2

Texture: Loam consisting of fine stratification of sandy loam, silt loam, and silty clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 5 percent pebbles

Sodium adsorption ratio: 5 to 20

Calcium carbonate equivalent: 2 to 10 percent

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 7.9 to 9.0

2C horizon

Value: 5 or 6 moist; 6 or 7 dry

Chroma: 1 or 2

Texture: Loamy sand consisting of fine stratification of sandy loam, loam, and sand

Clay content: 0 to 15 percent

Content of rock fragments: 0 to 40 percent—0 to 15 percent cobbles; 0 to 25 percent pebbles

Reaction: pH 7.9 to 8.4

520B—Bobkitty clay loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces
Slope: 0 to 4 percent
Elevation: 3,950 to 4,300 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 120 days

Composition

Major Components

Bobkitty and similar soils: 85 percent

Minor Components

Slickspots: 0 to 8 percent
 Threeriv loam: 0 to 7 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

500A—Bobkitty-Bonebasin complex, 0 to 2 percent slopes

Setting

Landform:

- Bobkitty—Flood plains
- Bonebasin—Stream terraces

Slope:

- Bobkitty—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 3,950 to 5,700 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 120 days

Composition

Major Components

Bobkitty and similar soils: 65 percent
 Bonebasin and similar soils: 25 percent

Minor Components

Rivra gravelly sandy loam: 0 to 5 percent
 Ryell sandy loam: 0 to 3 percent
 Lamoose silt loam: 0 to 2 percent

Major Component Description

Bobkitty

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.1 inches

Bonebasin

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bonebasin Series

Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Permeability: Moderate above the 2C horizon and rapid in the 2C horizon
Landform: Flood plains and stream terraces
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation range: 3,950 to 6,100 feet
Annual precipitation: 10 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 115 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Fluvaquentic Endoaquolls

Typical Pedon

Bonebasin loam, in an area of Lamoose-Rivra-Bonebasin complex, 0 to 2 percent slopes, in an area of pasture, 1,500 feet south and 2,600 feet east of the northwest corner of sec. 32, T. 2 N., R. 2 E.

Oa—0 to 4 inches; very dark grayish brown (10YR 3/2) muck, grayish brown (10YR 5/2) dry; strongly effervescent; moderately alkaline; clear smooth boundary.

Ag—4 to 15 inches; very dark grayish brown (2.5Y 3/2) loam, grayish brown (2.5Y 5/2) dry; moderate fine subangular blocky structure; slightly hard, very friable, moderately sticky, and moderately plastic; many very fine, common fine, and few medium roots; slightly alkaline; gradual wavy boundary.

Cg—15 to 25 inches; olive gray (5Y 4/2) stratified loam and sandy loam, gray (5Y 5/1) dry; massive; soft, very friable, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; 10 percent pebbles; slightly alkaline; clear smooth boundary.

2C—25 to 60 inches; variegated very gravelly loamy sand; single grain; loose, nonsticky, and nonplastic; 20 percent cobbles and 40 percent pebbles; slightly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 15 inches

Depth to seasonal high water table: Ponded to 12 inches

Depth to the 2C horizon: 20 to 40 inches

Ag horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 2 or 3 moist; 4 or 5 dry

Chroma: 1 or 2

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 8.4

Cg horizon

Hue: 10YR, 7.5YR, 2.5Y, or 5Y

Value: 3, 4, or 5 moist; 4, 5, or 6 dry

Chroma: 1, 2, or 3

Texture: Loam, silt loam, or silty clay loam with strata of sandy loam, clay loam, sand, or gravel

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 25 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 6.6 to 8.4

2C horizon

Texture: Loamy sand, loamy coarse sand, or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 70 percent—10 to 20 percent cobbles; 25 to 50 percent pebbles

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 6.1 to 7.8

Bowery Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Alluvial fans, stream terraces, and escarpments

Parent material: Alluvium or colluvium

Slope range: 2 to 45 percent

Elevation range: 4,450 to 6,300 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Pachic Haplustolls

Typical Pedon

Bowery loam, 2 to 8 percent slopes, in an area of rangeland, 1,250 feet south and 800 feet east of the northwest corner of sec. 24, T. 4 N., R. 6 E.

A1—0 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine and very fine subangular blocky; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and fine roots; common very fine and fine pores; 5 percent pebbles; slightly acid; clear smooth boundary.

A2—9 to 22 inches; dark gray (10YR 4/1) loam; very dark brown (10YR 2/2) moist; moderate very fine subangular blocky structure parting to moderate fine and weak very fine granular; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; common very fine and fine pores; 5 percent pebbles; neutral; gradual smooth boundary.

Bw1—22 to 36 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; weak fine and very fine subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common very fine and fine pores; 10 percent pebbles; neutral; gradual smooth boundary.

Bw2—36 to 60 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; slightly hard, firm, moderately sticky, and moderately plastic; few fine roots; few very fine pores; 10 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 16 to 60 inches

A horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

Bw horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 10 to 25 percent—0 to 5 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

14C—Bowery loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 2 to 8 percent

Elevation: 4,500 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Bowery and similar soils: 90 percent

Minor Components

Soils with slopes more than 8 percent: 0 to 5 percent

Burnel loam: 0 to 3 percent

Anceney cobbly loam: 0 to 2 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 11.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Breeton Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately rapid

Landform: Alluvial fans, stream terraces, and hills

Parent material: Alluvium or colluvium

Slope range: 4 to 35 percent

Elevation range: 4,350 to 6,400 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Pachic Haplustolls

Typical Pedon

Breeton coarse sandy loam, 4 to 15 percent slopes, in an area of pasture, 300 feet north and 2,000 feet west of the southeast corner of sec. 12, T. 4 S., R. 3 E.

A1—0 to 10 inches; dark gray (10YR 4/1) coarse sandy loam, black (10YR 2/1) moist; moderate medium granular structure; hard, friable, slightly sticky, and nonplastic; many very fine and common fine roots, many very fine interstitial pores; 5 percent pebbles; slightly acid; clear smooth boundary.

A2—10 to 24 inches; dark gray (10YR 4/1) coarse sandy loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, and nonplastic; common very fine and fine roots; common very

fine interstitial pores; 5 percent pebbles; neutral; clear smooth boundary.

Bw—24 to 40 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky, and nonplastic; few very fine and fine roots; common very fine and fine interstitial pores; 10 percent pebbles; neutral; clear wavy boundary.

BC—40 to 60 inches; grayish brown (10YR 5/2) gravelly coarse sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky, and nonplastic; 20 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 8 and 24 inches

Mollic epipedon thickness: 16 to 40 inches

A horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 8 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.4

Bw horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Coarse sandy loam, sandy loam, or loam

Clay content: 8 to 18 percent

Content of rock fragments: 5 to 30 percent pebbles

Reaction: pH 6.1 to 7.8

BC horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Coarse sandy loam, loamy coarse sand, or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 10 to 30 percent pebbles

Reaction: pH 6.1 to 7.8

362D—Breeton coarse sandy loam, 4 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 4 to 15 percent

Elevation: 4,350 to 5,800 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Breeton and similar soils: 90 percent

Minor Components

Sawicki cobbly sandy loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Bridger Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Stream terraces, alluvial fans, drainageways, and hills

Parent material: Alluvium, colluvium, or alpine till

Slope range: 2 to 45 percent

Elevation range: 4,900 to 7,650 feet

Annual precipitation: 20 to 30 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Ustic Argicryolls

Typical Pedon

Bridger loam, in an area of Bridger-Libeg, stony complex, 8 to 25 percent slopes, in an area of rangeland, 100 feet south and 1,700 feet east of the northwest corner of sec. 36, T. 6 S., R. 3 E.

A—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to moderate medium granular; hard, friable, nonsticky, and nonplastic; many very fine and fine

and few medium and coarse roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—8 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure; slightly hard, firm, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bt2—15 to 28 inches; yellowish brown (10YR 5/4) gravelly clay loam, brown (10YR 4/3) moist; weak medium prismatic structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent cobbles and 15 percent pebbles; slightly alkaline; clear wavy boundary.

Bk1—28 to 49 inches; light gray (10YR 7/2) cobbly clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, very sticky, and moderately plastic; few very fine, fine, and medium roots; 20 percent cobbles and 15 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—49 to 60 inches; pale brown (10YR 6/3) gravelly clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; very hard, firm, moderately sticky, and slightly plastic; 5 percent cobbles and 30 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 16 inches

Depth to the Bk horizon: 17 to 40 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, or 5 dry; 2, 3, or 4 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, silty clay loam, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, silty clay loam, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.1 to 7.8

Bk horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Clay loam, sandy clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 25 percent cobbles; 5 to 30 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

379E—Bridger cobbly loam, 15 to 35 percent slopes, stony

Setting

Landform: Alluvial fans and stream terraces

Slope: 15 to 35 percent

Elevation: 5,200 to 7,150 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bridger and similar soils: 85 percent

Minor Components

Bridger loam: 0 to 5 percent

Redchief very stony loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

379D—Bridger cobbly loam, 8 to 15 percent slopes, stony

Setting

Landform: Alluvial fans and stream terraces

Slope: 8 to 15 percent

Elevation: 5,250 to 7,200 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bridger and similar soils: 85 percent

Minor Components

Bridger loam: 0 to 5 percent

Redchief very stony loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

79C—Bridger loam, 2 to 8 percent slopes

Setting

Landform: Stream terraces

Slope: 2 to 8 percent

Elevation: 5,450 to 6,200 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bridger and similar soils: 85 percent

Minor Components

Bridger clay loam: 0 to 5 percent

Libeg cobbly loam: 0 to 5 percent

Soils with a water table at 4 to 8 feet: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

179E—Bridger loam, cool, 4 to 25 percent slopes

Setting

Landform: Drainageways

Slope: 4 to 25 percent

Elevation: 4,900 to 6,850 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bridger and similar soils: 90 percent

Minor Components

Bangtail loam: 0 to 5 percent

Redlodge silty clay loam: 0 to 3 percent

Soils with slopes more than 25 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

779E—Bridger-Libeg, stony complex, 8 to 25 percent slopes

Setting

Landform:

- Bridger—Hills
- Libeg—Hills

Slope:

- Bridger—8 to 25 percent
- Libeg—8 to 25 percent

Elevation: 6,050 to 7,300 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bridger and similar soils: 50 percent

Libeg and similar soils: 35 percent

Minor Components

Libeg bouldery loam: 0 to 5 percent

Loberg stony loam: 0 to 5 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Major Component Description

Bridger

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alpine till

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.8 inches

Libeg

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alpine till

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

496D—Bridger-Ouselfal, very stony-Redlodge complex, 4 to 15 percent slopes

Setting

Landform:

- Bridger—Drainageways
- Ouselfal—Hills
- Redlodge—Closed depressions

Slope:

- Bridger—8 to 15 percent
- Ouselfal—8 to 15 percent
- Redlodge—4 to 6 percent

Elevation: 6,150 to 7,400 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Bridger and similar soils: 40 percent

Ouselfal and similar soils: 35 percent

Redlodge and similar soils: 10 percent

Minor Components

Yellowmule loam: 0 to 10 percent

Soils with a water table at 2.5 to 4 feet: 0 to 5 percent

Major Component Description

Bridger

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.8 inches

Ouselfal

Surface layer texture: Very flaggy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.6 inches

Redlodge*Surface layer texture:* Silty clay*Depth class:* Very deep (more than 60 inches)*Drainage class:* Poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Water table:* Apparent*Available water capacity:* Mainly 10.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**550E—Bridger-Redlodge complex,
4 to 25 percent slopes****Setting***Landform:*

- Bridger—Drainageways
- Redlodge—Drainageways

Slope:

- Bridger—4 to 25 percent
- Redlodge—4 to 6 percent

Elevation: 5,100 to 6,300 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Bridger and similar soils: 75 percent

Redlodge and similar soils: 15 percent

Minor Components

Bavdark loam: 0 to 5 percent

Soils with a water table at 1.5 to 3 feet: 0 to 3 percent

Libeg stony loam: 0 to 2 percent

Major Component Description**Bridger***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 7.8 inches**Redlodge***Surface layer texture:* Silty clay loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Water table:* Apparent*Available water capacity:* Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Brocko Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Moderate*Landform:* Relict stream terraces and hills*Parent material:* Loess*Slope range:* 0 to 35 percent*Elevation range:* 3,950 to 5,250 feet*Annual precipitation:* 10 to 16 inches*Annual air temperature:* 41 to 45 degrees F*Frost-free period:* 95 to 115 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Aridic Calcustepts

Typical Pedon

Brocko silt loam, 4 to 8 percent slopes, in an area of cropland, 1,320 feet north and 100 feet east of the southwest corner of sec. 12, T. 1 S., R. 1 E.

Ap—0 to 7 inches; pale brown (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk1—7 to 20 inches; light brownish gray (10YR 6/2) silt loam, dark brownish gray (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and few medium roots; few fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—20 to 60 inches; light brownish gray (10YR 6/2) silt loam, dark brownish gray (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very

fine and fine roots; few fine masses of lime;
violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 5 to 8 inches

Ap horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Clay content: 8 to 18 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.9 to 8.4

Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Texture: Silt loam or very fine sandy loam

Clay content: 8 to 18 percent

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 8.4

36B—Brocko silt loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces

Slope: 0 to 4 percent

Elevation: 4,100 to 5,150 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Brocko and similar soils: 90 percent

Minor Components

Clarkstone silt loam: 0 to 5 percent

Kalsted sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

36C—Brocko silt loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces

Slope: 4 to 8 percent

Elevation: 4,000 to 5,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Brocko and similar soils: 90 percent

Minor Components

Clarkstone silt loam: 0 to 5 percent

Kalsted sandy loam: 0 to 3 percent

Soils with more than 8 percent slopes: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

36D—Brocko silt loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces

Slope: 8 to 15 percent

Elevation: 3,950 to 5,050 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Brocko and similar soils: 90 percent

Minor Components

Clarkstone silt loam: 0 to 5 percent

Kalsted sandy loam: 0 to 3 percent

Soils with more than 15 percent slopes: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**336C—Brocko-Clarkstone silt loams,
4 to 8 percent slopes****Setting**

Landform:

- Brocko—Relict stream terraces
- Clarkstone—Relict stream terraces

Slope:

- Brocko—4 to 8 percent
- Clarkstone—4 to 8 percent

Elevation: 4,150 to 5,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition**Major Components**

Brocko and similar soils: 50 percent

Clarkstone and similar soils: 35 percent

Minor Components

Kalsted sandy loam: 0 to 10 percent

Crago cobbly loam: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 2 percent

Major Component Description**Brocko**

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.0 inches

Clarkstone

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 11.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**336D—Brocko-Clarkstone silt loams,
8 to 15 percent slopes****Setting**

Landform:

- Brocko—Relict stream terraces
- Clarkstone—Relict stream terraces

Slope:

- Brocko—8 to 15 percent
- Clarkstone—8 to 15 percent

Elevation: 4,000 to 5,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition**Major Components**

Brocko and similar soils: 50 percent

Clarkstone and similar soils: 35 percent

Minor Components

Kalsted sandy loam: 0 to 10 percent

Crago cobbly loam: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 2 percent

Major Component Description**Brocko**

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.0 inches

Clarkstone*Surface layer texture:* Silt loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Loess*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 11.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Brodyk Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Moderate*Landform:* Relict stream terraces*Parent material:* Loess*Slope range:* 4 to 45 percent*Elevation range:* 4,200 to 5,800 feet*Annual precipitation:* 14 to 19 inches*Annual air temperature:* 39 to 43 degrees F*Frost-free period:* 90 to 110 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Typic Calcustepts

Typical Pedon

Brodyk silt loam, in an area of Quagle-Brodyk silt loams, 4 to 8 percent slopes, in an area of cropland, 1,900 feet north and 1,500 feet east of the southwest corner of sec. 12, T. 2 N., R. 4 E.

Ap—0 to 6 inches; brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; strongly effervescent; slightly alkaline; abrupt smooth boundary.

Bk1—6 to 30 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; common very fine and fine roots; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—30 to 60 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak fine subangular

blocky structure; soft, very friable, slightly sticky, and nonplastic; few very fine roots; disseminated lime; few fine seams of lime; violently effervescent; moderately alkaline.

Range in Characteristics*Soil temperature:* 41 to 45 degrees F*Moisture control section:* Between 4 and 12 inches*Depth to the Bk horizon:* 5 to 7 inches**Ap horizon**

Value: 5 or 6 dry

Chroma: 2 or 3

Clay content: 18 to 22 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

Bk1 horizon

Value: 6 or 7 dry

Clay content: 10 to 18 percent

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

Bk2 horizon

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Silt loam or very fine sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

Burnel Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Moderately slow*Landform:* Stream terraces, alluvial fans, and drainageways*Parent material:* Alluvium*Slope range:* 2 to 8 percent*Elevation range:* 4,750 to 6,200 feet*Annual precipitation:* 18 to 22 inches*Annual air temperature:* 39 to 43 degrees F*Frost-free period:* 90 to 110 days

Taxonomic Class: Fine, smectitic, frigid Vertic Argiustolls

Typical Pedon

Burnel silty clay loam, 2 to 8 percent slopes, in an area of hayland, 350 feet south and 2,600 feet east of the northwest corner of sec. 20, T. 1 S., R. 7 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt1—6 to 9 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bt2—9 to 19 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; very hard, very firm, very sticky, and very plastic; few very fine and fine roots; common distinct clay films on faces of peds; 5 percent pebbles; slightly alkaline; clear wavy boundary.

Bk1—19 to 35 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, and very plastic; few very fine and fine roots; 5 percent pebbles; many fine irregular masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—35 to 60 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; very hard, very firm, slightly sticky, and slightly plastic; 5 percent pebbles; many fine irregular masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 17 to 35 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silty clay loam or clay loam

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silty clay loam or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.3

Bk horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

12C—Burnel silty clay loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 2 to 8 percent

Elevation: 4,750 to 6,000 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Burnel and similar soils: 90 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent

Soils with more than 8 percent slopes: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

212C—Burnel-Nythar complex, 2 to 8 percent slopes

Setting

Landform:

- Burnel—Drainageways
- Nythar—Drainageways

Slope:

- Burnel—2 to 8 percent
- Nythar—2 to 6 percent

Elevation: 4,900 to 6,200 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Burnel and similar soils: 75 percent

Nythar and similar soils: 15 percent

Minor Components

Billman clay loam: 0 to 5 percent

Enbar clay loam: 0 to 5 percent

Major Component Description

Burnel

Surface layer texture: Clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.6 inches

Nythar

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 9.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Busby Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately rapid

Landform: Alluvial fans and stream terraces

Parent material: Alluvium

Slope range: 0 to 15 percent

Elevation range: 4,000 to 5,050 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 43 to 45 degrees F

Frost-free period: 100 to 120 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Haplocalcidic Haplustepts

Typical Pedon

Busby loam, in an area of Busby-Birney complex, 0 to 4 percent slopes, in an area of cropland, 800 feet north and 400 feet west of the southeast corner of sec. 7, T. 3 N., R. 3 E.

A—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw1—4 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, fine and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw2—11 to 16 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bk—16 to 20 inches; pale brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; common very fine and fine roots; common fine masses of lime; violently effervescent; moderately alkaline; abrupt smooth boundary.

C1—20 to 30 inches; pale brown (10YR 6/3) stratified sandy loam and fine sandy loam, dark brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky, and nonplastic; few very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—30 to 60 inches; very pale brown (10YR 7/3) stratified fine sandy loam and loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky, and nonplastic; few very fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Depth to the BK horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 15 to 25 percent

Reaction: pH 7.9 to 8.4

Bw horizons

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Loam or sandy loam

Clay content: 10 to 18 percent

Reaction: pH 7.9 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Clay content: 10 to 18 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

C horizons

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Stratified sandy loam, fine sandy loam, and loamy sand

Clay content: 3 to 18 percent

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 7.9 to 8.4

27B—Busby loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 0 to 4 percent

Elevation: 4,300 to 4,500 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 100 to 120 days

Composition

Major Components

Busby and similar soils: 90 percent

Minor Components

Amesha loam: 0 to 5 percent

Trimad cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

727B—Busby-Birney complex, 0 to 4 percent slopes

Setting

Landform:

- Busby—Alluvial fans and stream terraces
- Birney—Alluvial fans and stream terraces

Slope:

- Busby—0 to 4 percent
- Birney—0 to 4 percent

Elevation: 4,000 to 4,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 100 to 120 days

Composition

Major Components

Busby and similar soils: 50 percent

Birney and similar soils: 35 percent

Minor Components

Alona silty clay loam: 0 to 5 percent

Scravo cobbly sandy loam: 0 to 5 percent

Soils with slopes more than 4 percent: 0 to 5 percent

Major Component Description

Busby

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.0 inches

Birney

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

727D—Busby-Birney complex, 4 to 15 percent slopes

Setting

Landform:

- Busby—Alluvial fans and stream terraces
- Birney—Alluvial fans and stream terraces

Slope:

- Busby—4 to 15 percent
- Birney—4 to 15 percent

Elevation: 4,050 to 5,050 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 100 to 120 days

Composition

Major Components

Busby and similar soils: 50 percent

Birney and similar soils: 35 percent

Minor Components

Birney cobbly loam: 0 to 5 percent

Chinook fine sandy loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Busby

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.0 inches

Birney

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Cabba Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Hills and escarpments

Parent material: Interbedded sandstone and shale residuum or semiconsolidated, loamy and clayey sedimentary beds

Slope range: 4 to 60 percent

Elevation range: 4,500 to 6,500 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 37 to 43 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents.

Typical Pedon

Cabba silt loam in an area of Martinsdale-Cabba complex, 8 to 15 percent slopes, in an area of cropland, 2,800 feet north and 1,200 feet west of the southeast corner of sec. 15, T. 2 S., R. 3 E.

Ap—0 to 4 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and common fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—4 to 8 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and common fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—8 to 17 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and few fine roots; 10 percent soft angular siltstone

fragments; many medium masses of lime; violently effervescent; strongly alkaline; clear wavy boundary.

Cr1—17 to 19 inches; light gray (10YR 7/2) highly weathered siltstone that crushes to loam; few fine roots in cracks; violently effervescent; strongly alkaline (pH 8.6); clear wavy boundary.

Cr2—19 to 60 inches; semiconsolidated siltstone.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Cr horizon: 10 to 20 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 1, 2, 3, or 4

Texture: Silt loam, loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 15 percent cobbles; 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 1 through 6

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Cr horizons

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 1 through 6

315F—Cabba-Bacbuster complex, 15 to 60 percent slopes

Setting

Landform:

- Cabba—Escarpments
- Bacbuster—Escarpments

Slope:

- Cabba—15 to 60 percent
- Bacbuster—15 to 35 percent

Elevation: 4,500 to 6,500 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Cabba and similar soils: 50 percent

Bacbuster and similar soils: 40 percent

Minor Components

Norbert silty clay loam: 0 to 4 percent

Castner channery loam: 0 to 3 percent

Billman moist, clay loam: 0 to 2 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Cabba

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.7 inches

Bacbuster

Surface layer texture: Cobbly clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

615F—Cabba-Castner complex, 15 to 60 percent slopes

Setting

Landform:

- Cabba—Escarpments
- Castner—Escarpments

Slope:

- Cabba—15 to 60 percent
- Castner—15 to 60 percent

Elevation: 4,550 to 6,200 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Cabba and similar soils: 50 percent
Castner and similar soils: 35 percent

Minor Components

Reedwest stony loam: 0 to 10 percent
Rock outcrop: 0 to 5 percent

Major Component Description

Cabba

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.9 inches

Castner

Surface layer texture: Very flaggy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

415D—Cabba-Reedwest complex, 4 to 15 percent slopes

Setting

Landform:

- Cabba—Hills
- Reedwest—Hills

Slope:

- Cabba—4 to 15 percent
- Reedwest—4 to 15 percent

Elevation: 4,600 to 5,850 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Cabba and similar soils: 65 percent
Reedwest and similar soils: 20 percent

Minor Components

Beanlake loam: 0 to 5 percent
Norbert silty clay: 0 to 5 percent
Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Cabba

Surface layer texture: Clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.7 inches

Reedwest

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

747E—Cabba-Reedwest-Anceney complex, 15 to 45 percent slopes

Setting

Landform:

- Cabba—Escarpments
- Reedwest—Escarpments
- Anceney—Escarpments

Slope:

- Cabba—25 to 45 percent
- Reedwest—15 to 35 percent
- Anceney—15 to 45 percent

Elevation: 4,500 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Cabba and similar soils: 35 percent
 Reedwest and similar soils: 30 percent
 Anceney and similar soils: 25 percent

Minor Components

Bowery loam: 0 to 5 percent
 Soils with slopes more than 45 percent: 0 to 3 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Cabba

Surface layer texture: Cobbly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.7 inches

Reedwest

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.3 inches

Anceney

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Cabbart Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Sedimentary plains, hills, and escarpments

Parent material: Semiconsolidated, loamy sedimentary beds

Slope range: 2 to 45 percent

Elevation range: 4,050 to 5,500 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Loamy, mixed, superactive, calcareous, frigid, shallow Aridic Ustorthents

Typical Pedon

Cabbart cobbly loam in an area of Cabbart-Amesha-Trimad complex, 15 to 45 percent slopes, in an area of rangeland, 1,500 feet south and 1,200 feet east of the northwest corner of sec. 7, T. 1 S., R. 1 E.

A—0 to 3 inches; grayish brown (10YR 5/2) cobbly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 10 percent cobbles, 10 percent pebbles, and 10 percent soft siltstone fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk1—3 to 12 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 5 percent cobbles, 5 percent pebbles, and 10 percent soft siltstone fragments; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—12 to 19 inches; light gray (10YR 7/2) loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine roots; 25 percent soft siltstone fragments; common fine masses of lime; violently effervescent; strongly alkaline; clear wavy boundary.

Cr—19 to 60 inches; semiconsolidated, calcareous siltstone.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Cr horizon: 10 to 20 inches

A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Loam or sandy loam

Clay content: 15 to 27 percent
 Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles
 Calcium carbonate equivalent: 5 to 10 percent
 Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR, 2.5Y, or 5Y
 Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
 Chroma: 2, 3, or 4
 Texture: Loam, silt loam, or clay loam
 Clay content: 18 to 35 percent
 Content of rock fragments: 0 to 50 percent soft and hard fragments—0 to 5 percent cobbles; 0 to 10 percent pebbles; 0 to 50 percent soft siltstone fragments
 Calcium carbonate equivalent: 15 to 25 percent
 Reaction: pH 7.9 to 9.0

810E—Cabbart, moist-Amesha-Trimad complex, 15 to 45 percent slopes

Setting

Landform:

- Cabbart—Escarpments
- Amesha—Escarpments
- Trimad—Escarpments

Slope:

- Cabbart—15 to 45 percent
- Amesha—15 to 45 percent
- Trimad—15 to 45 percent

Elevation: 4,050 to 5,250 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Cabbart and similar soils: 50 percent

Amesha and similar soils: 25 percent

Trimad and similar soils: 15 percent

Minor Components

Rock outcrop: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 5 percent

Major Component Description

Cabbart

Surface layer texture: Gravelly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.3 inches

Amesha

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

Trimad

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

710C—Cabbart-Amesha loams, 2 to 8 percent slopes

Setting

Landform:

- Cabbart—Sedimentary plains
- Amesha—Sedimentary plains

Slope:

- Cabbart—2 to 8 percent
- Amesha—2 to 8 percent

Elevation: 4,250 to 5,250 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Cabbart and similar soils: 55 percent

Amesha and similar soils: 30 percent

Minor Components

Headwaters loam: 0 to 10 percent

Rock outcrop: 0 to 5 percent

Major Component Description

Cabbart

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.3 inches

Amesha

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

710D—Cabbart-Amesha loams, 8 to 15 percent slopes

Setting

Landform:

- Cabbart—Hills
- Amesha—Hills

Slope:

- Cabbart—8 to 15 percent
- Amesha—8 to 15 percent

Elevation: 4,050 to 5,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Cabbart and similar soils: 55 percent
 Amesha and similar soils: 30 percent

Minor Components

Headwaters loam: 0 to 10 percent
 Rock outcrop: 0 to 5 percent

Major Component Description

Cabbart

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.3 inches

Amesha

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

710E—Cabbart-Amesha-Trimad complex, 15 to 45 percent slopes

Setting

Landform:

- Cabbart—Escarpments
- Amesha—Escarpments
- Trimad—Escarpments

Slope:

- Cabbart—15 to 45 percent
- Amesha—15 to 45 percent
- Trimad—15 to 45 percent

Elevation: 4,050 to 5,500 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Cabbart and similar soils: 50 percent
 Amesha and similar soils: 25 percent
 Trimad and similar soils: 15 percent

Minor Components

Rock outcrop: 0 to 5 percent
 Soils less than 10 inches deep to bedrock: 0 to 5 percent

Major Component Description

Cabbart

Surface layer texture: Cobbly loam
Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.3 inches

Amesha

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.8 inches

Trimad

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Castner Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Hills and escarpments

Parent material: Interbedded sandstone and shale residuum or argillite and sandstone residuum

Slope range: 4 to 70 percent

Elevation range: 4,300 to 6,800 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 39 to 45 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

Typical Pedon

Castner channery loam, in an area of Castner, very stony-Quigley, very stony-Rock outcrop complex, 15 to 45 percent slopes, in an area of rangeland, 2,200 feet north and 2,200 feet east of the southwest corner of sec. 5, T. 2 N., R. 5 E.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) channery loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky, and nonplastic; many very fine and fine roots; 10 percent flagstones and 20 percent channers; neutral; clear smooth boundary.

A2—2 to 6 inches; dark grayish brown (10YR 4/2) channery loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, very friable, nonsticky, and nonplastic; common very fine and fine roots; 5 percent flagstones and 15 percent channers; neutral; clear smooth boundary.

Bk—6 to 18 inches; light brownish gray (10YR 6/2) very channery loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and nonplastic; few very fine and fine roots; 5 percent flagstones and 45 percent channers; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

R—18 inches; hard sandstone.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 8 and 18 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to bedrock: 10 to 20 inches

Depth to the Bk horizon: 6 to 15 inches

A1 horizon

Hue: 2.5Y, 10YR, 7.5YR, or 5YR

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 10 to 18 percent

Content of rock fragments: 15 to 50 percent—5 to 15 percent stones; 0 to 15 percent cobbles or flagstones; 10 to 20 percent pebbles or channers

Reaction: pH 6.6 to 7.8

A2 horizon

Hue: 2.5Y, 10YR, 7.5YR, or 5YR

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Texture: Loam or sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 15 to 70 percent—0 to 10 percent stones; 0 to 10 percent cobbles; 15 to 50 percent pebbles or channers

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 2.5Y, 10YR, 7.5YR, or 5YR

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Loam or sandy loam
 Clay content: 10 to 18 percent
 Content of rock fragments: 40 to 80 percent—5 to 15 percent stones; 0 to 25 percent cobbles; 20 to 45 percent pebbles or channers
 Calcium carbonate equivalent: 3 to 15 percent
 Reaction: pH 7.4 to 8.4

670E—Castner, very stony-Quigley, very stony-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Castner—Hills
- Quigley—Hills
- Rock outcrop—Hills

Slope:

- Castner—15 to 45 percent
- Quigley—15 to 35 percent

Elevation: 4,750 to 6,250 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Castner and similar soils: 45 percent
 Quigley and similar soils: 35 percent
 Rock outcrop: 10 percent

Minor Components

Absarook loam: 0 to 5 percent
 Quigley bouldery loam: 0 to 5 percent

Major Component Description

Castner

Surface layer texture: Channery loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Sandstone residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.6 inches

Quigley

Surface layer texture: Very cobbly loam cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.6 inches

Rock outcrop

Definition: Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

770F—Castner-Reedwest-Rock outcrop complex, 25 to 60 percent slopes

Setting

Landform:

- Castner—Escarpments
- Reedwest—Escarpments
- Rock outcrop—Escarpments

Slope:

- Castner—25 to 60 percent
- Reedwest—25 to 35 percent

Elevation: 4,500 to 6,600 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Castner and similar soils: 60 percent
 Reedwest and similar soils: 20 percent
 Rock outcrop: 10 percent

Minor Components

Bacbuster clay loam: 0 to 5 percent
 Farnuf loam: 0 to 5 percent

Major Component Description

Castner

Surface layer texture: Channery loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.6 inches

Reedwest

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.3 inches

Rock outcrop

Definition: Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Catgulch Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Hills

Parent material: Gneiss or schist residuum

Slope range: 4 to 75 percent

Elevation range: 4,350 to 7,150 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

Typical Pedon

Catgulch very cobbly coarse sandy loam, in an area of Bielenberg-Catgulch, very stony-Breeton complex, 15 to 45 percent slopes, in an area of rangeland, 1,200 feet north and 1,600 feet east of the southwest corner of sec. 15, T. 3 S., R. 3 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) very cobbly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine roots; 5 percent stones, 15 percent cobbles, and 30 percent pebbles; neutral; clear smooth boundary.

Bw—5 to 15 inches; dark yellowish brown (10YR 4/4) very gravelly coarse sandy loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and nonplastic; common very fine and fine roots; 5 percent stones, 15 percent cobbles, and 35 percent pebbles; neutral; clear wavy boundary.

Cr—15 to 19 inches; highly decomposed gneiss bedrock.

R—19 inches; hard gneiss bedrock.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 8 inches and the lithic contact.

Mollic epipedon thickness: 7 to 8 inches

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 12 to 20 percent

Content of rock fragments: 15 to 50 percent—0 to 3 percent boulders; 0 to 5 percent stones; 10 to 20 percent cobbles; 5 to 30 percent pebbles

Reaction: pH 6.1 to 7.3

Bw horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3, 4, or 6

Texture: Sandy loam, coarse sandy loam, or sandy clay loam

Clay content: 10 to 22 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 0 to 20 percent cobbles; 35 to 60 percent pebbles

Reaction: pH 6.1 to 7.3

487E—Catgulch, bouldery-Rock outcrop complex, 8 to 35 percent slopes

Setting

Landform: Hills

Slope: 8 to 35 percent

Elevation: 4,850 to 6,450 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Catgulch and similar soils: 70 percent

Rock outcrop: 20 percent

Minor Components

Bielenberg sandy clay loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Major Component Description

Catgulch

Surface layer texture: Very cobbly coarse sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.1 inches

Rock outcrop

Definition: Exposures of gneiss or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

654E—Catgulch, very stony-Bielenberg-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Catgulch—Hills
- Bielenberg—Hills
- Rock outcrop—Hills

Slope:

- Catgulch—15 to 45 percent
- Bielenberg—15 to 45 percent

Elevation: 4,900 to 6,650 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Catgulch and similar soils: 60 percent

Bielenberg and similar soils: 15 percent

Rock outcrop: 10 percent

Minor Components

Breton coarse sandy loam: 0 to 10 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Major Component Description

Catgulch

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.1 inches

Bielenberg

Surface layer texture: Sandy clay loam

Depth class: Deep (40 to 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.4 inches

Rock outcrop

Definition: Exposures of gneiss or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

654G—Catgulch, very stony-Rock outcrop complex, 55 to 75 percent slopes

Setting

Landform:

- Catgulch—Hills
- Rock outcrop—Hills

Slope: 55 to 75 percent

Elevation: 4,350 to 6,800 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Catgulch and similar soils: 70 percent

Rock outcrop: 15 percent

Minor Components

Bielenberg sandy loam: 0 to 10 percent

Breton coarse sandy loam: 0 to 5 percent

Major Component Description

Catgulch

Surface layer texture: Very cobbly coarse sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.1 inches

Rock outcrop

Definition: Exposures of gneiss or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

787F—Catgulch, very stony-Spanpeak, stony-Bavdark complex, 25 to 60 percent slopes

Setting

Landform:

- Catgulch—Hills, south aspects
- Spanpeak—Hills, north aspects
- Bavdark—Hills

Slope:

- Catgulch—35 to 60 percent
- Spanpeak—35 to 60 percent
- Bavdark—25 to 45 percent

Elevation: 5,200 to 7,150 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Catgulch and similar soils: 45 percent

Spanpeak and similar soils: 30 percent

Bavdark and similar soils: 15 percent

Minor Components

Rock outcrop: 0 to 5 percent

Soils with slopes more than 60 percent: 0 to 5 percent

Major Component Description

Catgulch

Surface layer texture: Very cobbly coarse sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.1 inches

Spanpeak

Surface layer texture: Cobbly coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.7 inches

Bavdark

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Chinook Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately rapid

Landform: Alluvial fans, stream terraces, relict stream terraces, and escarpments

Parent material: Alluvium

Slope range: 0 to 35 percent

Elevation range: 3,950 to 5,100 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Aridic Haplustolls

Typical Pedon

Chinook fine sandy loam, 4 to 8 percent slopes, in an area of cropland, 600 feet north and 1,200 feet west of the southeast corner of sec. 11, T. 1 S., R. 2 E.

Ap—0 to 4 inches; grayish brown (10YR 5/2) fine sandy loam, very dark brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky, and nonplastic; many fine roots; slightly alkaline; abrupt smooth boundary.

Bw1—4 to 12 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; slightly alkaline; clear smooth boundary.

Bw2—12 to 22 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky, and nonplastic; many very fine and fine roots; neutral; clear wavy boundary.

Bk1—22 to 36 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; weak fine

subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many fine roots; few fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—36 to 60 inches; light gray (10YR 7/2) fine sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few fine roots; few fine threads and seams of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the Bk horizon: 12 to 35 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent
pebbles

Reaction: pH 6.6 to 8.4

Bw horizons

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent
pebbles

Reaction: pH 6.6 to 8.4

Bk horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Fine sandy loam or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent
pebbles

Calcium carbonate equivalent: 3 to 15 percent

Reaction: pH 7.4 to 8.4

38B—Chinook fine sandy loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans

Slope: 0 to 4 percent

Elevation: 3,950 to 5,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Chinook and similar soils: 90 percent

Minor Components

Kalsted sandy loam: 0 to 5 percent

Varney sandy clay loam: 0 to 3 percent

Trimad cobbly sandy loam: 0 to 2 percent

Major Component Description

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

38E—Chinook fine sandy loam, 15 to 35 percent slopes

Setting

Landform: Escarpments

Slope: 15 to 35 percent

Elevation: 4,050 to 5,050 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Chinook and similar soils: 85 percent

Minor Components

Cabbart loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Trimad cobbly sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

38C—Chinook fine sandy loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans

Slope: 4 to 8 percent

Elevation: 4,050 to 5,050 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Chinook and similar soils: 90 percent

Minor Components

Kalsted sandy loam: 0 to 5 percent

Varney sandy clay loam: 0 to 3 percent

Trimad cobbly sandy loam: 0 to 2 percent

Major Component Description

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

38D—Chinook fine sandy loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans

Slope: 8 to 15 percent

Elevation: 4,100 to 5,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Chinook and similar soils: 90 percent

Minor Components

Kalsted sandy loam: 0 to 5 percent

Varney sandy clay loam: 0 to 3 percent

Trimad cobbly sandy loam: 0 to 2 percent

Major Component Description

Surface layer texture: Fine sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

438D—Chinook-Kalsted sandy loams, 8 to 15 percent slopes

Setting

Landform:

- Chinook—Alluvial fans and stream terraces
- Kalsted—Alluvial fans and stream terraces

Slope:

- Chinook—8 to 15 percent
- Kalsted—8 to 15 percent

Elevation: 3,950 to 5,000 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Chinook and similar soils: 60 percent

Kalsted and similar soils: 25 percent

Minor Components

Crago cobbly loam: 0 to 10 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Chinook

Surface layer texture: Sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.1 inches

Kalsted

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Clarkstone Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Relict stream terraces
Parent material: Loess
Slope range: 0 to 15 percent
Elevation range: 3,950 to 5,100 feet
Annual precipitation: 10 to 14 inches
Annual air temperature: 43 to 45 degrees F
Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Torriorthentic Haplustolls

Typical Pedon

Clarkstone silt loam, 0 to 4 percent slopes, in an area of cropland, 2,300 feet south and 1,500 feet east of the northwest corner of sec. 33, T. 4 N., R. 3 E.

Ap—0 to 7 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; slightly alkaline; clear smooth boundary.

Bw—7 to 9 inches; brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure;

soft, very friable, slightly sticky, and slightly plastic; few very fine, fine, and medium roots; slightly alkaline; clear smooth boundary.

Bk1—9 to 22 inches; light gray (10YR 7/2) silt loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; few fine masses of lime, disseminated lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—22 to 27 inches; light gray (10YR 7/2) silt loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft very friable, slightly sticky, and nonplastic; few very fine roots; few fine masses of lime, disseminated lime; violently effervescent; moderately alkaline; clear smooth boundary.

BC—27 to 60 inches; light gray (10YR 7/2) silt loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky, and nonplastic; disseminated lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F
Moisture control section: Between 4 and 12 inches
Mollic epipedon thickness: 7 to 9 inches
Depth to the Bk horizon: 7 to 9 inches

Ap horizon

Value: 2 or 3 moist
 Chroma: 2 or 3
 Clay content: 10 to 20 percent
 Reaction: pH 6.6 to 7.8

Bw horizon

Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 or 3
 Clay content: 10 to 20 percent
 Reaction: pH 7.4 to 8.4

Bk horizons

Value: 6 or 7 dry; 4, 5, or 6 moist
 Chroma: 2 or 3
 Clay content: 10 to 18 percent
 Calcium carbonate equivalent: 15 to 30 percent
 Reaction: pH 7.9 to 8.4

BC horizon

Value: 6 or 7 dry; 4, 5, or 6 moist
 Chroma: 2 or 3
 Clay content: 10 to 18 percent
 Calcium carbonate equivalent: 15 to 30 percent
 Reaction: pH 7.9 to 8.4

18B—Clarkstone silt loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Elevation: 3,950 to 5,000 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Clarkstone and similar soils: 90 percent

Minor Components

Brocko silt loam: 0 to 5 percent
 Kalsted sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

18C—Clarkstone silt loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces
Slope: 4 to 8 percent
Elevation: 4,000 to 4,850 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Clarkstone and similar soils: 85 percent

Minor Components

Brocko silt loam: 0 to 5 percent
 Kalsted sandy loam: 0 to 5 percent
 Soils with slopes more than 8 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Clasoil Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate above the BC horizon and moderately rapid in the BC horizon
Landform: Alluvial fans and stream terraces
Parent material: Alluvium
Slope range: 2 to 15 percent
Elevation range: 4,500 to 5,550 feet
Annual precipitation: 15 to 19 inches
Annual air temperature: 39 to 43 degrees F
Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Clasoil cobbly sandy loam, 2 to 6 percent slopes, in an area of cropland, 600 feet north and 1,800 feet east of the southwest corner of sec. 6, T. 1 S., R. 6 E.

A—0 to 7 inches; dark grayish brown (10YR 4/2) cobbly sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 10 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.
 Bt1—7 to 12 inches; brown, (10YR 4/3) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt2—12 to 22 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt3—22 to 28 inches; brown (10YR 4/3) gravelly sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common distinct clay films on faces of peds; 5 percent cobbles and 20 percent pebbles; neutral; clear smooth boundary.

BC—28 to 60 inches; grayish brown (10YR 5/2) very gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; massive; loose, nonsticky, and nonplastic; 10 percent cobbles and 35 percent pebbles, slightly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

A horizon

Hue: 10YR or 2.5Y

Value: 2, 3, or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Sandy loam or loam

Clay content: 12 to 20 percent

Content of rock fragments: 0 to 25 percent—0 to

10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizons

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Sandy clay loam, clay loam, or loam

Clay content: 18 to 30 percent

Content of rock fragments: 5 to 35 percent—0 to

20 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 7.3

BC horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Sandy loam, loam, or coarse sandy loam

Clay content: 12 to 20 percent

Content of rock fragments: 15 to 40 percent—0 to

5 percent stones; 0 to 15 percent cobbles; 15 to

35 percent pebbles

Reaction: pH 6.1 to 7.8

254B—Clasol cobbly sandy loam, 2 to 6 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 2 to 6 percent

Elevation: 4,500 to 5,050 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Clasol and similar soils: 90 percent

Minor Components

Clasol loam: 0 to 5 percent

Sawicki very cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

54C—Clasol loam, 4 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 4 to 8 percent

Elevation: 4,700 to 5,450 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Clasol and similar soils: 85 percent

Minor Components

Breton loam: 0 to 5 percent

Sawicki cobbly loam: 0 to 5 percent

Clasol cobbly sandy loam: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

54D—Clasoil loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 8 to 15 percent
Elevation: 4,500 to 5,550 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Clasoil and similar soils: 85 percent

Minor Components

Breton loam: 0 to 5 percent
 Sawicki cobbly loam: 0 to 5 percent
 Clasoil cobbly sandy loam: 0 to 3 percent
 Soils with slopes more than 15 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Copenhaver Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderately slow
Landform: Mountains and hills
Parent material: Interbedded sandstone and shale residuum or sandstone residuum
Slope range: 4 to 60 percent
Elevation range: 4,950 to 8,000 feet
Annual precipitation: 20 to 24 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Argicryolls

Typical Pedon

Copenhaver flaggy loam, in an area of Bangtail-Copenhaver complex, 8 to 25 percent slopes, in an area of rangeland, 1,900 feet north and 2,000 feet east of the southwest corner of sec. 27, T. 5 N., R. 7 E.

A—0 to 7 inches; very dark grayish brown (10YR 3/2) flaggy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; many very fine and fine pores; 15 percent flagstones and 15 percent channers; slightly acid; abrupt smooth boundary.

Bt1—7 to 11 inches; brown (10YR 4/3) very flaggy sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; common fine and medium roots; many very fine and fine pores; common distinct clay films on faces of peds and lining pores; 30 percent flagstones and 20 percent channers; slightly acid; gradual smooth boundary.

Bt2—11 to 15 inches; brown (10YR 5/3) very flaggy sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; common fine and medium roots; many very fine and fine pores; common distinct clay films on faces of peds and lining pores; 25 percent flagstones and 25 percent channers; slightly acid; gradual smooth boundary.

R—15 inches; hard sandstone.

Range in Characteristics

Soil temperature: 36 to 40 degree F
Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 10YR, 7.5YR, or 5YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 70 percent—0 to 10 percent stones; 0 to 30 percent cobbles or flagstones; 15 to 30 percent pebbles or channers

Reaction: pH 6.1 to 7.3

Bt horizons

Hue: 10YR, 7.5YR, or 5YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 to 6

Texture: Sandy clay loam or clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 35 to 80 percent—15 to 30 percent cobbles or flagstones; 20 to 50 percent pebbles or channers

Reaction: pH 6.1 to 7.8

178F—Copenhaver flaggy loam, 35 to 60 percent slopes

Setting

Landform: Hills

Slope: 35 to 60 percent

Elevation: 5,050 to 7,100 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Copenhaver and similar soils: 85 percent

Minor Components

Copenhaver extremely stony loam: 0 to 5 percent

Rock outcrop: 0 to 5 percent

Rubble land: 0 to 5 percent

Major Component Description

Surface layer texture: Flaggy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

178E—Copenhaver-Rock outcrop complex, 8 to 35 percent slopes

Setting

Landform:

- Copenhaver—Hills
- Rock outcrop—Hills

Slope: 8 to 35 percent

Elevation: 5,850 to 7,300 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Copenhaver and similar soils: 70 percent

Rock outcrop: 20 percent

Minor Components

Bangtail loam: 0 to 8 percent

Rubble land: 0 to 2 percent

Major Component Description

Copenhaver

Surface layer texture: Flaggy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

Rock outcrop

Definition: Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Corbly Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Rapid

Landform: Stream terraces, alluvial fans, and outwash plains

Parent material: Alluvium

Slope range: 0 to 8 percent

Elevation range: 4,300 to 5,400 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Entic Haplustolls

Typical Pedon

Corbly very gravelly sandy loam, 0 to 4 percent slopes, in an area of rangeland, 1,800 feet south and 1,600 feet east of the northwest corner of sec. 27, T. 1 N., R. 5 E.

A—0 to 5 inches; brown (10YR 4/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; loose, slightly sticky, and nonplastic; common very fine and fine and few medium roots; 5 percent cobbles and 40 percent pebbles; slightly alkaline; gradual smooth boundary.

AC—5 to 12 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 10 percent cobbles and 40 percent pebbles; slightly alkaline; gradual smooth boundary.

Ck1—12 to 22 inches; light yellowish brown (10YR 6/4) extremely gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, and nonplastic; few very fine, fine, and medium roots; 15 percent cobbles and 50 percent pebbles; strongly effervescent; moderately alkaline; diffuse smooth boundary.

Ck2—22 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, and nonplastic; few very fine roots; 15 percent cobbles and 60 percent pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 12 and 35 inches

Mollic epipedon thickness: 7 to 12 inches

Depth to the Ck horizon: 7 to 12 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Sandy loam or loam

Clay content: 15 to 25 percent

Content of rock fragments: 15 to 55 percent—0 to 10 percent stones; 5 to 15 percent cobbles; 10 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

AC horizon

Chroma: 2 or 3

Texture: Coarse sandy loam, sandy loam, or loam

Clay content: 10 to 20 percent

Content of rock fragments: 25 to 60 percent—5 to 20 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

Note: Some pedons contain a Bw horizon that does not extend to a depth of 10 inches

Ck horizons

Value: 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Loamy sand, loamy coarse sand, sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 85 percent—15 to 25 percent cobbles; 25 to 60 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

259B—Corbly very gravelly sandy loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 0 to 4 percent

Elevation: 4,350 to 5,350 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Corbly and similar soils: 85 percent

Minor Components

Corbly very cobbly loam: 0 to 10 percent

Corbly very stony loam: 0 to 5 percent

Major Component Description

Surface layer texture: Very gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

359C—Corbly very gravelly sandy loam, 4 to 8 percent slopes, stony**Setting**

Landform: Alluvial fans and stream terraces

Slope: 4 to 8 percent

Elevation: 4,850 to 5,400 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition**Major Components**

Corbly and similar soils: 90 percent

Minor Components

Channeled areas: 0 to 5 percent

Windham very stony loam: 0 to 5 percent

Major Component Description

Surface layer texture: Very gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Cowood Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Mountains and hills

Parent material: Sandstone residuum, interbedded sandstone and shale residuum, or gneiss or schist residuum

Slope range: 15 to 75 percent

Elevation range: 5,000 to 8,400 feet

Annual precipitation: 20 to 30 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Eutrocrypts

Typical Pedon

Cowood channery loam, 15 to 45 percent slopes, very stony, in an area of forest land, 150 feet south and 1,300 feet east of the northwest corner of sec. 30, T. 5 N., R. 5 E.

Oi—0 to 1 inch; root mat and undecomposed forest litter.

E—1 to 5 inches; grayish brown (10YR 5/2) channery loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine roots; 10 percent flagstones and 15 percent channers; slightly acid; clear smooth boundary.

Bw—5 to 17 inches; pale brown (10YR 6/3) very flaggy coarse sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure parting to weak very fine granular; soft, very friable, nonsticky, and nonplastic; common fine and few medium roots; 30 percent flagstones and 20 percent channers; slightly acid; abrupt wavy boundary.

R—17 inches; hard quartzite.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to bedrock: 10 to 20 inches

E horizon

Value: 5 or 6 dry; 2, 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 10 to 22 percent

Content of rock fragments: 25 to 60 percent—0 to 5 percent stones; 10 to 20 percent cobbles or flagstones; 15 to 35 percent pebbles or channers

Reaction: pH 5.1 to 6.5

Bw horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Loam or coarse sandy loam

Clay content: 10 to 22 percent

Content of rock fragments: 50 to 80 percent—20 to 40 percent cobbles or flagstones; 20 to 40 percent pebbles or channers

Reaction: pH 5.1 to 6.5

993E—Cowood channery loam, 15 to 45 percent slopes, very stony

Setting

Landform: Hills

Slope: 15 to 45 percent

Elevation: 6,000 to 7,000 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Cowood and similar soils: 90 percent

Minor Components

Cowood extremely stony loam: 0 to 5 percent

Rocko stony loam: 0 to 5 percent

Major Component Description

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Sandstone residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Crago Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Relict stream terraces, escarpments, and hills

Parent material: Alluvium, colluvium, or limestone colluvium

Slope range: 0 to 60 percent

Elevation range: 3,950 to 5,750 feet

Annual precipitation: 10 to 16 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Loamy-skeletal, carbonatic, frigid
Aridic Calcustepts

Typical Pedon

Crago cobbly loam, in an area of Crago-Musselshell complex, 0 to 4 percent slopes, in an area of cropland, 1,500 feet north and 1,500 feet west of the southeast corner of sec. 30, T. 1 N., R. 2 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) cobbly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 10 percent cobbles and 5 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—6 to 18 inches; white (10YR 8/2) very cobbly loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, and slightly plastic; common very fine roots; 25 percent cobbles and 20 percent pebbles; common pieces of fractured petrocalcic material; prominent lime casts and pendants on rock fragments; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—18 to 60 inches; white (10YR 8/2) very cobbly sandy loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; hard, firm, slightly sticky, and slightly plastic; few very fine roots; 25 percent cobbles and 30 percent pebbles; many pieces of fractured petrocalcic material; prominent lime casts and pendants of cemented sand and small pebbles on undersides of rock fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 4 to 6 inches

Ap horizon

Hue: 2.5Y, 10YR, or 7.5YR
 Value: 4, 5, or 6 dry; 3, 4, or 5 moist
 Chroma: 2 or 3
 Clay content: 15 to 27 percent
 Content of rock fragments: 15 to 40 percent—0 to 5 percent stones; 5 to 15 percent cobbles; 5 to 25 percent pebbles
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 2.5Y, 10YR, or 7.5YR
 Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist
 Chroma: 2, 3, or 4
 Texture: Loam or sandy loam
 Clay content: 15 to 30 percent
 Content of rock fragments: 35 to 75 percent—15 to 30 percent cobbles; 20 to 50 percent pebbles
 Calcium carbonate equivalent: 40 to 50 percent
 Reaction: pH 7.9 to 8.4

**930F—Crago, stony-Quigley-
 Rock outcrop complex
 25 to 60 percent slopes**

Setting*Landform:*

- Crago—Hills
- Quigley—Hills
- Rock outcrop—Hills

Slope:

- Crago—25 to 60 percent
- Quigley—25 to 60 percent

Elevation: 4,450 to 5,000 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 95 to 115 days

Composition**Major Components**

Crago and similar soils: 50 percent
 Quigley and similar soils: 30 percent
 Rock outcrop: 10 percent

Minor Components

Musselshell loam: 0 to 5 percent
 Pensore stony loam: 0 to 5 percent

Major Component Description**Crago**

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Limestone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.7 inches

Quigley

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Limestone alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.0 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**430E—Crago-Beanlake complex,
 15 to 35 percent slopes**

Setting*Landform:*

- Crago—Escarpments, south aspects
- Beanlake—Escarpments, north aspects

Slope:

- Crago—15 to 35 percent
- Beanlake—15 to 35 percent

Elevation: 4,600 to 5,200 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 95 to 115 days

Composition**Major Components**

Crago and similar soils: 50 percent
 Beanlake and similar soils: 40 percent

Minor Components

Musselshell loam: 0 to 5 percent
 Soils with slopes more than 35 percent: 0 to 5 percent

Major Component Description**Crago**

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.8 inches

Beanlake

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

734B—Crago-Musselshell complex, 0 to 4 percent slopes

Setting

Landform:

- Crago—Relict stream terraces
- Musselshell—Relict stream terraces

Slope:

- Crago—0 to 4 percent
- Musselshell—0 to 4 percent

Elevation: 4,150 to 5,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Crago and similar soils: 60 percent

Musselshell and similar soils: 25 percent

Minor Components

Crago very cobbly loam: 0 to 5 percent

Soils that have a petrocalcic horizon at 10 to 20 inches: 0 to 10 percent

Major Component Description

Crago

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.7 inches

Musselshell

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

734C—Crago-Musselshell complex, 4 to 8 percent slopes

Setting

Landform:

- Crago—Relict stream terraces
- Musselshell—Relict stream terraces

Slope:

- Crago—4 to 8 percent
- Musselshell—4 to 8 percent

Elevation: 4,100 to 5,350 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Crago and similar soils: 60 percent

Musselshell and similar soils: 25 percent

Minor Components

Soils that have a petrocalcic horizon at 10 to 20 inches: 0 to 10 percent

Crago very cobbly loam: 0 to 5 percent

Major Component Description

Crago

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.7 inches

Musselshell

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

734D—Crago-Musselshell complex, 8 to 15 percent slopes

Setting

Landform:

- Crago—Relict stream terraces
- Musselshell—Relict stream terraces

Slope:

- Crago—8 to 15 percent
- Musselshell—8 to 15 percent

Elevation: 4,100 to 5,500 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Crago and similar soils: 65 percent

Musselshell and similar soils: 20 percent

Minor Components

Crago very cobbly loam: 0 to 10 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Crago

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.7 inches

Musselshell

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

730C—Crago-Pensore gravelly loams, 4 to 15 percent slopes

Setting

Landform:

- Crago—Hills
- Pensore—Hills

Slope:

- Crago—4 to 15 percent
- Pensore—4 to 15 percent

Elevation: 4,050 to 5,700 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Crago and similar soils: 50 percent

Pensore and similar soils: 35 percent

Minor Components

Crago stony loam: 0 to 5 percent

Rock outcrop: 0 to 5 percent

Soils 20 to 40 inches deep to bedrock: 0 to 5 percent

Major Component Description

Crago

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.3 inches

Pensore

Surface layer texture: Gravelly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Limestone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

730E—Crago-Pensore-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Crago—Hills
- Pensore—Hills
- Rock outcrop—Hills

Slope:

- Crago—15 to 45 percent
- Pensore—15 to 45 percent

Elevation: 3,950 to 5,750 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Crago and similar soils: 40 percent

Pensore and similar soils: 30 percent

Rock outcrop: 15 percent

Minor Components

Crago stony loam: 0 to 5 percent

Musselshell loam: 0 to 5 percent

Soils 20 to 40 inches deep to bedrock: 0 to 5 percent

Major Component Description

Crago

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.3 inches

Pensore

Surface layer texture: Gravelly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Limestone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.5 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

630E—Crago-Pensore-Rock outcrop complex, 15 to 45 percent slopes, very stony

Setting

Landform:

- Crago—Hills
- Pensore—Hills
- Rock outcrop—Hills

Slope:

- Crago—15 to 45 percent
- Pensore—15 to 45 percent

Elevation: 4,150 to 5,050 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Crago and similar soils: 60 percent

Pensore and similar soils: 20 percent

Rock outcrop: 10 percent

Minor Components

Musselshell loam: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 3 percent

Crago bouldery loam: 0 to 2 percent

Major Component Description

Crago

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.6 inches

Pensore

Surface layer texture: Very cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Limestone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.4 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

830E—Crago-Scravo complex, 15 to 45 percent slopes

Setting

Landform:

- Crago—Escarpments
- Scravo—Escarpments

Slope:

- Crago—15 to 45 percent
- Scravo—15 to 45 percent

Elevation: 4,100 to 5,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition**Major Components**

Crago and similar soils: 50 percent

Scravo and similar soils: 40 percent

Minor Components

Udecide sandy clay loam: 0 to 5 percent

Blacksheep sandy loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Crago**

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

Scravo

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Danaher Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Mountains

Parent material: Sandstone colluvium

Slope range: 8 to 45 percent

Elevation range: 5,300 to 7,100 feet

Annual precipitation: 25 to 30 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Ustic
Glossocryalfs

Typical Pedon

Danaher loam, in an area of Danaher, stony-Loberg, very stony complex 15 to 45 percent slopes, in an area of forest land, 2,200 feet south and 2,200 feet west of the northeast corner of sec. 2, T. 3 S., R. 6 E.

Oi—0 to 3 inches; slightly decomposed needles and twigs.

E—3 to 8 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 3 percent stones, 5 percent cobbles, and 5 percent pebbles; moderately acid; clear smooth boundary.

E/Bt—8 to 13 inches; E part (80 percent) light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist, B part (20 percent) light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; moderate fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent stones, 5 percent cobbles, and 5 percent pebbles; strongly acid; clear smooth boundary.

Bt1—13 to 29 inches; very pale brown (10YR 7/3) gravelly clay, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, and very plastic; many distinct clay films on faces of peds and lining pores; common very fine and fine roots; 5 percent

stones, 5 percent cobbles, and 15 percent pebbles; strongly acid; clear wavy boundary.

Bt2—29 to 60 inches; light yellowish brown (10YR 6/4) cobbly clay, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, and very plastic; common very fine roots; many distinct clay films on faces of peds and lining pores; 5 percent stones, 15 percent cobbles, and 10 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

E horizon

Hue: 2.5YR, 5YR, 7.5YR, or 10YR

Value: 6 or 7 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 1 to 25 percent—1 to 3 percent stones; 0 to 10 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 5.6 to 7.3

E/Bt horizon

Hue: 2.5YR, 5YR, 7.5YR, or 10YR

Value: E part 6 or 7 dry; 4 or 5 moist; Bt part 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 5.1 to 7.3

Bt horizons

Hue: 2.5YR, 5YR, 7.5YR, or 10YR

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 15 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 5.1 to 7.3

792E—Danaher, stony-Loberg, very stony complex, 15 to 45 percent slopes

Setting

Landform:

- Danaher—Mountains
- Loberg—Mountains

Slope:

- Danaher—15 to 45 percent
- Loberg—15 to 45 percent

Elevation: 5,450 to 7,100 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Danaher and similar soils: 70 percent

Loberg and similar soils: 20 percent

Minor Components

Cowood very stony loam: 0 to 6 percent

Rock outcrop: 0 to 3 percent

Redlodge silty clay loam: 0 to 1 percent

Major Component Description

Danaher

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 9.0 inches

Loberg

Surface layer texture: Very flaggy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

792D—Danaher, stony-Loberg, very stony complex, 8 to 15 percent slopes

Setting

Landform:

- Danaher—Mountains
- Loberg—Mountains

Slope:

- Danaher—8 to 15 percent
- Loberg—8 to 15 percent

Elevation: 5,300 to 6,900 feet*Mean annual precipitation:* 25 to 30 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Danaher and similar soils: 70 percent

Loberg and similar soils: 20 percent

Minor Components

Stemple stony sandy loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 4 percent

Redlodge silty clay loam: 0 to 1 percent

Major Component Description**Danaher***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 9.0 inches**Loberg***Surface layer texture:* Very flaggy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Danvers Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Slow*Landform:* Relict stream terraces*Parent material:* Alluvium or loess*Slope range:* 0 to 15 percent*Elevation range:* 4,600 to 5,900 feet*Annual precipitation:* 15 to 19 inches*Annual air temperature:* 39 to 43 degrees F*Frost-free period:* 90 to 110 days

Taxonomic Class: Fine, smectitic, frigid Vertic Argiustolls

Typical Pedon

Danvers silty clay loam, 4 to 8 percent slopes, in an area of cropland, 2,900 feet north and 2,400 feet west of the southeast corner of sec. 25, T. 2 S., R. 3 E.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent cobbles; neutral; clear smooth boundary.

Bt1—4 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; many distinct clay films on faces of peds; neutral; clear smooth boundary.

Bt2—7 to 16 inches; pale brown (10YR 6/3) silty clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine roots; many distinct clay films on faces of peds; neutral; clear smooth boundary.

Bk—16 to 42 inches; light gray (10YR 7/2) clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine roots; 5 percent pebbles; common medium masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

2C—42 to 60 inches; light gray (10YR 7/2) gravelly clay loam, brown (10YR 5/3) moist; massive; slightly hard, friable, moderately sticky, and moderately plastic; strongly effervescent; 5 percent cobbles and 15 percent pebbles; moderately alkaline.

Range in Characteristics*Soil temperature:* 41 to 45 degrees F*Moisture control section:* Between 4 and 12 inches*Mollic epipedon thickness:* 7 to 12 inches*Depth to the Bk horizon:* 14 to 25 inches*Ap horizon*

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3
 Texture: Clay loam or silty clay loam
 Clay content: 27 to 35 percent
 Content of rock fragments: 0 to 20 percent—0 to 15 percent cobbles; 0 to 5 percent pebbles
 Reaction: pH 6.1 to 7.8

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y
 Value: 4, 5, or 6 dry; 2, 3, or 4 moist
 Chroma: 2, 3, or 4
 Texture: Silty clay loam or silty clay
 Clay content: 35 to 50 percent
 Content of rock fragments: 0 to 10 percent pebbles
 Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y
 Value: 6, 7, or 8 dry; 5 or 6 moist
 Chroma: 1, 2, or 3
 Texture: Clay loam or silty clay loam
 Clay content: 27 to 40 percent
 Content of rock fragments: 0 to 10 percent pebbles
 Calcium carbonate equivalent: 20 to 40 percent
 Reaction: pH 7.4 to 8.4

2C horizon

Hue: 7.5YR, 10YR or 2.5Y
 Value: 6 or 7 dry; 5 or 6 moist
 Chroma: 2 or 3
 Texture: Clay loam, sandy loam, or loam
 Clay content: 10 to 35 percent
 Content of rock fragments: 15 to 25 percent—0 to 5 percent cobbles; 15 to 20 percent pebbles
 Reaction: pH 7.4 to 8.4

258D—Danvers cobbly clay loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces
Slope: 8 to 15 percent
Elevation: 5,050 to 5,900 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Danvers and similar soils: 90 percent

Minor Components

Shawmut very cobbly loam: 0 to 5 percent
 Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

58B—Danvers silty clay loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Elevation: 4,750 to 5,800 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Danvers and similar soils: 90 percent

Minor Components

Danvers cobbly clay loam: 0 to 5 percent
 Tamaneen cobbly clay loam: 0 to 3 percent
 Soils with slopes more than 4 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

58C—Danvers silty clay loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces

Slope: 4 to 8 percent

Elevation: 4,750 to 5,750 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Danvers and similar soils: 90 percent

Minor Components

Danvers cobbly clay loam: 0 to 5 percent

Quagle silty loam: 0 to 3 percent

Soils with slopes more than 8 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

58D—Danvers silty clay loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces

Slope: 8 to 15 percent

Elevation: 4,750 to 5,600 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Danvers and similar soils: 90 percent

Minor Components

Danvers cobbly clay loam: 0 to 5 percent

Quagle silty loam: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

458C—Danvers-Quagle complex, 4 to 8 percent slopes

Setting

Landform:

- Danvers—Relict stream terraces
- Quagle—Relict stream terraces

Slope:

- Danvers—4 to 8 percent
- Quagle—4 to 8 percent

Elevation: 4,700 to 5,200 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Danvers and similar soils: 70 percent

Quagle and similar soils: 20 percent

Minor Components

Meagher cobbly loam: 0 to 5 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Major Component Description

Danvers

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.4 inches

Quagle

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

458D—Danvers-Quagle complex, 8 to 15 percent slopes

Setting

Landform:

- Danvers—Relict stream terraces
- Quagle—Relict stream terraces

Slope:

- Danvers—8 to 15 percent
- Quagle—8 to 15 percent

Elevation: 4,600 to 5,450 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Danvers and similar soils: 70 percent

Quagle and similar soils: 20 percent

Minor Components

Meagher cobbly loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Danvers

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.4 inches

Quagle

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

DA—Denied access

Composition

Major Components

Denied access: 100 percent

Major Component Description

Definition: Areas where mapping access was denied by the landowner.

Doby Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Hills

Parent material: Interbedded sandstone and shale residuum

Slope range: 15 to 45 percent

Elevation range: 5,900 to 6,600 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Clayey, smectitic, shallow Ustic Haplocryolls

Typical Pedon

Doby clay loam, in an area of Bangtail-Doby-Redlodge complex, 4 to 45 percent slopes, in an area of rangeland, 300 feet north and 1,300 feet east of the southwest corner of sec. 2, T. 4 N., R. 7 E.

A—0 to 5 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; moderate fine and medium granular structure; soft, friable, moderately sticky, and moderately plastic; many very fine and fine roots; many very fine and fine vesicular pores; 5 percent channers; neutral; abrupt smooth boundary.

Bw1—5 to 10 inches; grayish brown (2.5Y 5/2) clay, dark gray (10YR 4/1) moist; moderate medium subangular blocky structure; hard, firm, very sticky, and very plastic; many very fine and fine roots; few very fine tubular pores; 5 percent channers; neutral; clear smooth boundary.

Bw2—10 to 15 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (10YR 4/1) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky, and very plastic; few fine and medium roots; few very fine vesicular pores; 10 percent channers; neutral; clear smooth boundary.

C—15 to 19 inches; light brownish gray (2.5Y 6/2) channery clay, dark gray (10YR 4/1) moist; weak coarse prismatic structure; hard, firm, very sticky, and very plastic; few fine and medium roots; 20 percent soft shale fragments; neutral; clear smooth boundary.

Cr—19 to 60 inches; gray (10YR 5/1) dark gray semiconsolidated shale (10YR 4/1) moist; few very fine and fine roots between shale fragments; strongly effervescent; moderately alkaline; common irregular coatings of lime on undersides of shale fragments.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Cr horizon: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 15 percent channers

Reaction: pH 6.6 to 7.3

Bw horizons

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 1, 2, 3, or 4

Clay content: 45 to 55 percent

Content of rock fragments: 0 to 20 percent channers

Reaction: pH 6.6 to 7.3

C horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 1 or 2

Clay content: 45 to 55 percent

Content of rock fragments: 0 to 20 percent channers

Reaction: pH 6.6 to 7.3

Doughty Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Relict stream terraces and alluvial fans

Parent material: Alluvium

Slope range: 0 to 15 percent

Elevation range: 4,850 to 6,300 feet

Annual precipitation: 18 to 22 inches

Annual air temperature: 37 to 41 degrees F

Frost-free period: 80 to 95 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Doughty loam, 4 to 8 percent slopes, in an area of pasture, 1,320 feet north and 2,400 feet west of the southeast corner of sec. 28, T. 1 S., R. 6 E.

A—0 to 8 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; moderate fine subangular blocky structure; slightly hard, very friable, moderately sticky, and moderately plastic; many very fine and fine roots; 5 percent cobbles and 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bt—8 to 15 inches; dark grayish brown (10YR 4/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, very sticky, and very plastic; common very fine and fine roots; common distinct clay films on faces of peds and lining pores; 5 percent cobbles and 15 percent pebbles; slightly alkaline; clear smooth boundary.

Bk—15 to 21 inches; grayish brown (10YR 5/2) gravelly clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common fine masses of lime; 5 percent cobbles and 20 percent pebbles; strongly effervescent, moderately alkaline; clear wavy boundary.

2Ck—21 to 60 inches; light gray (10YR 7/2) very gravelly loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, moderately sticky, and moderately plastic; few very fine and fine roots; 10 percent cobbles and 40 percent pebbles; few fine masses of lime; violently effervescent, moderately alkaline.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 16 inches

Depth to the Bk horizon: 10 to 24 inches

Depth to the 2C horizon: 20 to 40 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist
 Clay content: 18 to 27 percent
 Content of rock fragments: 0 to 25 percent—0 to 15 percent cobbles; 0 to 10 percent pebbles
 Reaction: pH 6.1 to 7.8

Bt horizon

Value: 4 or 5 dry; 3 or 4 moist
 Chroma: 2 or 3
 Texture: Clay loam or silty clay loam
 Clay content: 27 to 35 percent
 Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent pebbles
 Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR
 Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist
 Chroma: 2 or 3
 Texture: Clay loam or loam
 Clay content: 18 to 32 percent
 Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent pebbles
 Calcium carbonate equivalent: 15 to 40 percent
 Reaction: pH 7.4 to 8.4

2Ck horizon

Hue: 10YR
 Value: 7 or 8 dry; 5 or 6 moist
 Chroma: 2 or 3
 Texture: Sandy clay loam, sandy loam, or loam
 Clay content: 15 to 25 percent
 Content of rock fragments: 40 to 75 percent—10 to 30 percent cobbles; 30 to 50 percent pebbles
 Calcium carbonate equivalent: 15 to 40 percent
 Reaction: pH 7.9 to 8.4

272B—Doughty cobbly loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Elevation: 5,300 to 6,300 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Doughty and similar soils: 90 percent

Minor Components

Shawmut very cobbly loam: 0 to 5 percent
 Tamaneen cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

272C—Doughty cobbly loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces
Slope: 4 to 8 percent
Elevation: 5,150 to 6,100 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Doughty and similar soils: 90 percent

Minor Components

Shawmut very cobbly loam: 0 to 5 percent
 Tamaneen cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

272D—Doughty cobbly loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces
Slope: 8 to 15 percent
Elevation: 4,950 to 6,300 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Doughty and similar soils: 90 percent

Minor Components

Shawmut very cobbly loam: 0 to 5 percent
 Tamaneen cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

72C—Doughty loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 4 to 8 percent
Elevation: 5,000 to 5,650 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Doughty and similar soils: 90 percent

Minor Components

Doughty cobbly loam: 0 to 5 percent
 Anceney cobbly loam: 0 to 3 percent
 Soils with slopes more than 8 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

72D—Doughty loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 8 to 15 percent
Elevation: 4,850 to 5,300 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Doughty and similar soils: 90 percent

Minor Components

Doughty cobbly loam: 0 to 5 percent
 Anceney cobbly loam: 0 to 3 percent
 Soils with slopes more than 15 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Durston Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Slow*Landform:* Relict stream terraces and alluvial fans*Parent material:* Loess or reworked loess*Slope range:* 0 to 15 percent*Elevation range:* 4,850 to 6,000 feet*Annual precipitation:* 18 to 22 inches*Annual air temperature:* 37 to 41 degrees F*Frost-free period:* 80 to 95 days**Taxonomic Class:** Fine, mixed, superactive, frigid
Typic Argiustolls**Typical Pedon**

Durston silty clay loam, 4 to 8 percent slopes, in an area of hayland, 2,000 feet south and 1,300 feet east of the northwest corner of sec. 27, T. 2 S., R. 6 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silty clay loam, black (10YR 2/1) moist; weak fine granular structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and common fine and medium roots; slightly acid; clear smooth boundary.

Bt1—6 to 14 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist, weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; common distinct clay films on faces of peds and lining pores; neutral; gradual smooth boundary.

Bt2—14 to 25 inches; yellowish brown (10YR 5/4) silty clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; common very fine and few fine and medium roots; common distinct clay films on faces of peds and lining pores; slightly alkaline; clear smooth boundary.

Bk1—25 to 40 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; few very fine roots; many medium masses of lime; violently effervescent; slightly alkaline; gradual smooth boundary.

Bk2—40 to 60 inches; brown (10YR 5/3) silt loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; very hard, friable, moderately sticky, and slightly plastic; few very fine roots;

common medium masses of lime; strongly effervescent; slightly alkaline.

Range in Characteristics*Soil temperature:* 39 to 43 degrees F*Moisture control section:* Between 4 and 12 inches*Mollic epipedon thickness:* 8 to 15 inches*Depth to the Bk horizon:* 20 to 40 inches**Ap horizon**

Value: 3 or 4 dry; 2 or 3 moist

Texture: Silty clay loam or clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

Bt1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Silty clay loam, silty clay, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

Bt2 horizon

Value: 4 or 5 dry

Chroma: 3 or 4

Texture: Silty clay loam, silty clay, clay loam, or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bk1 horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Silty clay loam, silt loam, or clay loam

Clay content: 25 to 40 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

Bk2 horizon

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Silty clay loam, silt loam, or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.4 to 8.4

858C—Durstons cobbly clay loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 4 to 8 percent
Elevation: 5,350 to 5,750 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Durstons and similar soils: 90 percent

Minor Components

Durstons very cobbly loam: 0 to 5 percent
 Soils with slopes more than 8 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess or alluvium from loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

858D—Durstons cobbly clay loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 8 to 15 percent
Elevation: 5,350 to 5,600 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Durstons and similar soils: 90 percent

Minor Components

Durstons very cobbly loam: 0 to 5 percent
 Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess or alluvium from loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

658B—Durstons silty clay loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 0 to 4 percent
Elevation: 5,150 to 6,000 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Durstons and similar soils: 90 percent

Minor Components

Doughty cobbly loam: 0 to 5 percent
 Durstons cobbly clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess or alluvium from loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

658C—Durston silty clay loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 4 to 8 percent
Elevation: 4,850 to 5,650 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Durston and similar soils: 90 percent

Minor Components

Doughty cobbly loam: 0 to 5 percent
 Durston cobbly clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess or alluvium from loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

658D—Durston silty clay loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 8 to 15 percent
Elevation: 4,850 to 5,550 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Durston and similar soils: 90 percent

Minor Components

Doughty cobbly loam: 0 to 5 percent
 Durston cobbly clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess or alluvium from loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Emyd Series

Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the 2C horizon and rapid below
Landform: Flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation range: 3,950 to 4,200 feet
Annual precipitation: 10 to 14 inches
Annual air temperature: 43 to 45 degrees F
Frost-free period: 100 to 120 days

Taxonomic Class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid Oxyaquic Ustifluvents

Typical Pedon

Emyd loam, in an area of Rivra-Emyd-Greycliff complex, 0 to 2 percent slopes, protected, in an area of rangeland, 2,100 feet north and 1,600 feet east of the southwest corner of sec. 18, T. 3 N., R. 3 E.

A1—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; slightly effervescent; moderately alkaline; clear smooth boundary.

A2—3 to 9 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; strongly

effervescent; moderately alkaline; clear smooth boundary.

- C1—9 to 23 inches; light brownish gray (10YR 6/2) loam consisting of strata of sandy loam, fine sandy loam and loamy sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; violently effervescent; strongly alkaline; abrupt smooth boundary.
- 2C2—23 to 60 inches; variegated very gravelly loamy sand; massive; loose, nonsticky, and nonplastic; few very fine roots; 15 percent cobbles and 40 percent pebbles; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F

Moisture control section: Between 12 and 35 inches

Depth to the 2C horizon: 20 to 40 inches

Depth to seasonal high water table: 42 to 60 inches

Note: The A horizon will not meet the thickness requirements of a mollic epipedon.

A1 and A2 horizons

Value: 3 or 4 moist; 4, 5, or 6 dry

Clay content: 10 to 20 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 7.9 to 8.4

C1 horizon

Value: 4 or 5 moist; 6 or 7 dry

Texture: Loam consisting of fine stratification of sandy loam, fine sandy loam, and loamy sand with less than 50 percent fine or coarser sand

Clay content: 10 to 25 percent; averages less than 18 percent when mixed

Content of rock fragments: 0 to 10 percent pebbles

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 8.5 to 9.6

2C2 horizon

Texture: Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 75 percent—5 to 25 percent cobbles; 35 to 50 percent pebbles

Reaction: pH 7.9 to 8.4

Enbar Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Moderate

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 8 percent

Elevation range: 4,150 to 6,300 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Cumulic Haplustolls

Typical Pedon

Enbar loam, in an area of Enbar-Nythar loams, 0 to 4 percent slopes, in an area of woodland, 1,000 feet north and 1,700 feet east of the southwest corner of sec. 1, T. 1 N., R. 5 E.

A1—0 to 12 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; strong very fine and fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine, fine, medium, and coarse roots; neutral; clear smooth boundary.

A2—12 to 22 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; neutral; clear smooth boundary.

Cg1—22 to 37 inches; dark gray (10YR 4/1) sandy loam, grayish brown (10YR 5/2) dry; common fine prominent strong brown (7.5YR 4/6) redox concentrations; weak medium subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; slightly alkaline; gradual smooth boundary.

Cg2—37 to 49 inches; gray (10YR 5/1) sandy loam, light brownish gray (10YR 6/2) dry; many fine prominent strong brown (7.5YR 4/6) redox concentrations; massive; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; slightly alkaline; clear smooth boundary.

2C—49 to 60 inches; gray (10YR 5/1) very gravelly loamy sand, light gray (10YR 6/1) dry; few fine prominent brownish yellow (10YR 6/6) redox concentrations; single grain; loose, nonsticky, and nonplastic; 5 percent cobbles and 45 percent pebbles; slightly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 16 to 28 inches

Depth to seasonal high water table: 24 to 42 inches

Depth to the 2C horizon: 40 to 60 inches

A horizons

Hue: 5YR, 7.5YR, or 10YR

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Cg horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 0, 1, or 2

Texture: Loam, sandy loam, silt loam, or silty clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 7.4 to 8.4

2C horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 1, 2, or 3

Texture: Loamy sand or sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 35 to 75 percent—0 to 5 percent cobbles; 35 to 70 percent pebbles

Reaction: pH 7.4 to 8.4

**522A—Enbar clay loam,
0 to 2 percent slopes**

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Elevation: 4,300 to 5,850 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Enbar and similar soils: 85 percent

Minor Components

Nythar loam: 0 to 5 percent

Straw loam: 0 to 5 percent

Sudworth silty clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 8.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

509B—Enbar loam, 0 to 4 percent slopes

Setting

Landform: Flood plains

Slope: 0 to 4 percent

Elevation: 4,400 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Enbar and similar soils: 85 percent

Minor Components

Nythar loam: 0 to 10 percent

Straw loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 8.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

512D—Enbar-Bowery-Nythar complex, 4 to 15 percent slopes

Setting

Landform:

- Enbar—Flood plains
- Bowery—Alluvial fans and stream terraces
- Nythar—Flood plains

Slope:

- Enbar—4 to 8 percent
- Bowery—4 to 15 percent
- Nythar—4 to 6 percent

Elevation: 4,450 to 6,300 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Enbar and similar soils: 55 percent

Bowery and similar soils: 20 percent

Nythar and similar soils: 15 percent

Minor Components

Blossberg loam: 0 to 5 percent

Straw loam: 0 to 5 percent

Major Component Description

Enbar

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Forest land

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 8.8 inches

Bowery

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 11.2 inches

Nythar

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 9.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

512B—Enbar-Nythar loams, 0 to 4 percent slopes

Setting

Landform:

- Enbar—Flood plains
- Nythar—Flood plains

Slope:

- Enbar—0 to 4 percent
- Nythar—0 to 4 percent

Elevation: 4,300 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Enbar and similar soils: 60 percent

Nythar and similar soils: 30 percent

Minor Components

Blossberg loam: 0 to 5 percent

Straw loam: 0 to 5 percent

Major Component Description

Enbar

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Forest land

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 8.8 inches

Nythar

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 9.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

523A—Enbar-Nythar loams, cool, 0 to 4 percent slopes

Setting

Landform:

- Enbar—Flood plains
- Nythar—Flood plains

Slope:

- Enbar—0 to 4 percent
- Nythar—0 to 4 percent

Elevation: 4,150 to 6,100 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition

Major Components

Enbar and similar soils: 70 percent

Nythar and similar soils: 20 percent

Minor Components

Sudworth loam: 0 to 5 percent

Straw loam: 0 to 3 percent

Blossberg loam: 0 to 2 percent

Major Component Description

Enbar

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 8.8 inches

Nythar

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 9.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Fairway Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Moderate above the 2Cg horizon and rapid in the 2Cg horizon

Landform: Flood plains and stream terraces

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 3,950 to 6,000 feet

Annual precipitation: 10 to 19 inches

Annual air temperature: 39 to 45 degrees F

Frost-free period: 90 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Fluvaquent Haplustolls

Typical Pedon

Fairway loam, in an area of Ryell-Rivra-Fairway complex, 0 to 2 percent slopes, in an area of cropland, 1,700 feet north and 100 feet west of the southeast corner of sec. 26, T. 1 N., R. 1 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky, and nonplastic; common very fine, medium, and coarse roots; strongly effervescent; moderately alkaline; clear smooth boundary.

A2—7 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; soft, very friable, nonsticky, and slightly plastic; common very fine, medium, and coarse roots; strongly effervescent; moderately alkaline; clear smooth boundary.

A3—13 to 15 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate medium angular blocky structure; soft, very friable, nonsticky, and slightly plastic; common very fine, medium, and coarse roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C—15 to 28 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and few medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

Cg1—28 to 34 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; few fine distinct

brownish yellow (10YR 6/6) redox concentrations; massive; hard, firm, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; slightly effervescent; moderately alkaline; clear wavy boundary.

Cg2—34 to 46 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; few fine distinct brownish yellow (10YR 6/6) redox concentrations; massive, slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; slightly effervescent; moderately alkaline; diffuse wavy boundary.

2Cg—46 to 60 inches; light gray (10YR 7/2) sand, dark grayish brown (10YR 4/2) moist; few fine distinct brownish yellow (10YR 6/6) redox concentrations; loose, nonsticky, and nonplastic; slightly alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 15 inches

Depth to seasonal high water table: 24 to 42 inches

Depth to the 2C horizon: 40 inches or more

A horizons

Hue: 10YR or 2.5Y

Value: 2 or 3 moist; 4 or 5 dry

Chroma: 1 or 2

Texture: Loam, silt loam, silty clay loam, or clay loam

Clay content: 15 to 35 percent

Calcium carbonate equivalent: 2 to 15 percent

Electrical conductivity (mmhos/cm): 0 to 8

Reaction: pH 7.4 to 8.4

C and Cg horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 moist

Chroma: 1, 2, or 3

Texture: Loam, silt loam, or silty clay loam; some with thin strata of sandy loam and clay loam

Clay content: 18 to 30 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 7.4 to 8.4

2Cg horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 moist; 6 or 7 dry

Chroma: 1 or 2

Texture: Sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 0 to 60 percent—0 to 5 percent cobbles; 0 to 55 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 6.6 to 7.8

511A—Fairway silt loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,100 to 4,950 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Fairway and similar soils: 85 percent

Minor Components

Blossberg loam: 0 to 10 percent

Meadowcreek loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 9.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

524A—Fairway-Bonebasin complex, 0 to 2 percent slopes

Setting

Landform:

- Fairway—Flood plains
- Bonebasin—Stream terraces

Slope:

- Fairway—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 5,300 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Fairway and similar soils: 70 percent
Bonebasin and similar soils: 20 percent

Minor Components

Blossberg loam: 0 to 5 percent
Soapcreek silty clay loam: 0 to 5 percent

Major Component Description

Fairway

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Available water capacity: Mainly 8.6 inches

Bonebasin

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

505A—Fairway-Rivra complex, 0 to 2 percent slopes

Setting

Landform:

- Fairway—Flood plains
- Rivra—Flood plains

Slope:

- Fairway—0 to 2 percent
- Rivra—0 to 2 percent

Elevation: 3,950 to 4,600 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Fairway and similar soils: 60 percent
Rivra and similar soils: 25 percent

Minor Components

Bonebasin loam: 0 to 5 percent
Meadowcreek silty clay loam: 0 to 5 percent
Ryell sandy loam: 0 to 5 percent

Major Component Description

Fairway

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Salt affected: Saline within 30 inches
Available water capacity: Mainly 8.1 inches

Rivra

Surface layer texture: Cobbly sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Available water capacity: Mainly 2.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

508A—Fairway-Threeriv-Rivra complex, 0 to 2 percent slopes

Setting

Landform:

- Fairway—Flood plains
- Threeriv—Flood plains
- Rivra—Flood plains

Slope:

- Fairway—0 to 2 percent
- Threeriv—0 to 2 percent
- Rivra—0 to 2 percent

Elevation: 4,000 to 4,900 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Fairway and similar soils: 50 percent

Threeriv and similar soils: 20 percent

Rivra and similar soils: 15 percent

Minor Components

Lamoose loam: 0 to 10 percent

Meadowcreek loam: 0 to 5 percent

Major Component Description

Fairway

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Salt affected: Saline within 30 inches

Available water capacity: Mainly 8.1 inches

Threeriv

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Occasional

Water table: Apparent

Available water capacity: Mainly 5.4 inches

Rivra

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 2.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Farnuf Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Hills and sedimentary plains

Parent material: Alluvium or colluvium

Slope range: 2 to 15 percent

Elevation range: 4,650 to 6,100 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 37 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Farnuf loam, in an area of Farnuf-Absarokee-Tolbert complex, 8 to 15 percent slopes, in an area of cropland, 200 feet south and 1,300 feet west of the northeast corner, sec. 36, T. 3 N., R. 7 E.

A—0 to 4 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; neutral; clear smooth boundary.

Bt1—4 to 8 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, moderately sticky, and moderately plastic; many very fine and few fine and medium roots; common distinct clay films on faces of peds; neutral; clear smooth boundary.

Bt2—8 to 16 inches; brown (10YR 5/3) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky, and moderately plastic; common very fine and few fine roots; common distinct clay films on faces of peds; neutral; clear smooth boundary.

Bt3—16 to 25 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and few fine roots; common distinct clay films on faces of peds; neutral; clear smooth boundary.

Bk1—25 to 36 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine roots; common fine masses of lime; strongly effervescent; slightly alkaline; gradual smooth boundary.

Bk2—36 to 60 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; common fine masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the Bk horizon: 10 to 25 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.8

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, 5, or 6 dry; 2, 3, or 4 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.8

Bk horizons

Hue: 7.5Y, 10YR, or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy loam, or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

768C—Farnuf-Absarokee complex, 4 to 8 percent slopes

Setting

Landform:

- Farnuf—Sedimentary plains
- Absarokee—Sedimentary plains

Slope:

- Farnuf—4 to 8 percent
- Absarokee—4 to 8 percent

Elevation: 5,200 to 5,900 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Farnuf and similar soils: 55 percent

Absarokee and similar soils: 30 percent

Minor Components

Soils with slopes more than 8 percent: 0 to 8 percent

Tolbert channery loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Farnuf

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.0 inches

Absarokee

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

768D—Farnuf-Absarokee-Tolbert complex, 8 to 15 percent slopes

Setting

Landform:

- Farnuf—Hills
- Absarokee—Hills
- Tolbert—Hills

Slope:

- Farnuf—8 to 15 percent
- Absarokee—8 to 15 percent
- Tolbert—8 to 15 percent

Elevation: 4,650 to 6,050 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Farnuf and similar soils: 50 percent

Absarokee and similar soils: 30 percent

Tolbert and similar soils: 10 percent

Minor Components

Work clay loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Farnuf

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.0 inches

Absarokee

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.7 inches

Tolbert

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

668C—Farnuf-Absarook-Tolbert complex, 2 to 8 percent slopes

Setting

Landform:

- Farnuf—Sedimentary plains
- Absarook—Sedimentary plains
- Tolbert—Sedimentary plains

Slope:

- Farnuf—2 to 8 percent
- Absarook—2 to 8 percent
- Tolbert—2 to 8 percent

Elevation: 5,400 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Farnuf and similar soils: 60 percent

Absarook and similar soils: 20 percent

Tolbert and similar soils: 5 percent

Minor Components

Absarokee clay loam: 0 to 8 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Farnuf

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.0 inches

Absarook

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.3 inches

Tolbert

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Farside Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Alluvial fans and stream terraces

Parent material: Alluvium derived from gneiss, schist, or sandstone

Slope range: 2 to 15 percent

Elevation range: 4,900 to 6,150 feet

Annual precipitation: 18 to 22 inches

Annual air temperature: 37 to 41 degrees F

Frost-free period: 80 to 95 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Farside loam, 2 to 6 percent slopes, in an area of cropland, 1,300 feet south and 900 feet west of the northeast corner of sec. 11, T. 3 S., R. 5 E.

A—0 to 11 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; 5 percent cobbles and 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—11 to 14 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and slightly plastic; common very fine and few medium roots; common distinct clay films on faces of peds and lining pores; 5 percent pebbles; neutral; clear smooth boundary.

Bt2—14 to 31 inches; dark brown (10YR 4/3) sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and slightly plastic; common very fine roots; common distinct clay films on faces of peds and lining pores; 10 percent pebbles; neutral; clear smooth boundary.

C—31 to 60 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; massive; loose, nonsticky, and nonplastic; few very fine roots; 5 percent cobbles and 20 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 15 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

Bt horizons

Value: 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Sandy clay loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

C horizon

Value: 4 or 5 dry

Chroma: 3, 4, 5, or 6

Texture: Sandy loam or coarse sandy loam
 Clay content: 5 to 18 percent
 Content of rock fragments: 15 to 45 percent—5 to 20 percent cobbles; 10 to 25 percent pebbles
 Reaction: pH 6.1 to 7.3
Note: This horizon may contain thin strata of sandy clay loam.

354B—Farside loam, 2 to 6 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 2 to 6 percent
Elevation: 5,000 to 5,700 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Farside and similar soils: 90 percent

Minor Components

Sawicki cobbly loam: 0 to 6 percent
 Breeton sandy loam: 0 to 4 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

354D—Farside loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 8 to 15 percent
Elevation: 4,900 to 6,150 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Farside and similar soils: 90 percent

Minor Components

Sawicki cobbly loam: 0 to 4 percent
 Bowery loam: 0 to 3 percent
 Soils with slopes more than 15 percent: 0 to 3 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Glendive Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Alluvial fans and flood plains
Parent material: Alluvium
Slope range: 0 to 8 percent
Elevation range: 3,950 to 4,900 feet
Annual precipitation: 10 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-loamy, mixed, superactive, calcareous, frigid Aridic Ustifluvents

Typical Pedon

Glendive sandy loam, 0 to 2 percent slopes, in an area of cropland, 1,400 feet north and 2,500 feet west of the southeast corner of sec. 21, T. 1 S., R. 2 E.

A—0 to 6 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; strongly effervescent; slightly alkaline; clear smooth boundary.

- C1—6 to 36 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2 moist); weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.
- C2—36 to 46 inches; light gray (10YR 7/2) fine sandy loam, brown (10YR 5/3 moist); massive; soft, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.
- C3—46 to 60 inches; white (10YR 7/2) fine sandy loam, brown (10YR 5/3 moist); massive; soft, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 47 degrees F

Moisture control section: Between 4 and 12 inches

A horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 7.4 to 8.4

C1 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Sandy loam or silt loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 7.4 to 8.4

C2 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 7.4 to 8.4

C3 horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Stratified fine sandy loam or silt loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.9 to 8.4

3A—Glendive sandy loam, 0 to 2 percent slopes

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Elevation: 3,950 to 4,750 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Glendive and similar soils: 85 percent

Minor Components

Fairway loam, slightly saline: 0 to 5 percent

Ryell sandy loam: 0 to 5 percent

Soils with dark surfaces: 0 to 5 percent

Major Component Description

Surface layer texture: Sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Available water capacity: Mainly 9.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

3C—Glendive sandy loam, 2 to 8 percent slopes

Setting

Landform: Alluvial fans

Slope: 2 to 8 percent

Elevation: 4,000 to 4,900 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Glendive and similar soils: 85 percent

Minor Components

Glendive coarse sandy loam: 0 to 5 percent

Glendive rarely flooded: 0 to 5 percent

Ryell sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

GP—Gravel pit

Composition

Major Components

Gravel pit: 100 percent

Major Component Description

Definition: Areas mined for sand and gravel.

Greycliff Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Low stream terraces and protected flood plains

Parent material: Calcareous alluvium

Slope range: 0 to 2 percent

Elevation range: 3,950 to 4,300 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 120 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Aridic Natrustolls

Typical Pedon

Greycliff silt loam, in an area of Greycliff-Toston-Threeriv complex, 0 to 2 percent slopes, in an area of rangeland, 500 feet north and 200 feet east of the southwest corner of sec. 21, T. 2 N., R. 2 E.

A—0 to 5 inches; grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; weak medium prismatic structure parting to moderate fine granular; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and common medium roots; many very fine, common fine and few medium pores; strongly effervescent; slightly alkaline; clear smooth boundary.

B_{tn}—5 to 11 inches; gray (10YR 5/1) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to strong medium subangular blocky; hard, friable, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; many very fine and common fine pores; common faint clay films on faces of peds and lining pores; strongly effervescent; strongly alkaline; gradual wavy boundary.

B_{tkn}—11 to 15 inches; light brownish gray (10YR 6/2) clay loam; dark gray (10YR 4/1) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; many very fine and common fine pores; common faint clay films on faces of peds and lining pores; common fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

B_{kn}—15 to 31 inches; light brownish gray (10YR 6/2) clay loam, dark gray (10YR 4/1) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; common very fine and few fine and medium pores; common fine masses of lime; violently effervescent; very strongly alkaline; clear smooth boundary.

C—31 to 37 inches; light brownish gray (10YR 6/2) sandy loam, dark gray (10YR 4/1) moist; common fine distinct dark yellowish brown (7.5YR 5/3) moist redox concentrations; massive; hard, friable, slightly sticky, and slightly plastic; few very fine roots; common very fine and few fine and medium pores; slightly effervescent; slightly alkaline; clear smooth boundary.

2C—37 to 60 inches; variegated very cobbly loamy sand; single grain; loose, nonsticky, and

nonplastic; few very fine roots; 20 percent cobbles and 25 percent pebbles; slightly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 12 inches

Depth to seasonal high water table: 24 to 42 inches

Depth to the 2C horizon: 20 to 40 inches

A horizon

Chroma: 1 or 2

Texture: Silt loam or loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 4

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 8.4

Btn horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 1 or 2

Texture: Loam or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 2 to 10 percent

Sodium adsorption ratio: 13 to 30

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 8.5 to 9.6

Btkn horizon

Value: 4 or 5 moist

Chroma: 1, 2, or 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 13 to 30

Reaction: pH 9.0 to 9.6

Bkn horizon

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 1, 2, or 3

Texture: Clay loam, sandy loam, or sandy clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 13 to 30

Reaction: pH 8.5 to 9.6

C horizon

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 1 to 3

Texture: Clay loam, sandy clay loam, or sandy loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 10 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 7.4 to 8.4

2C horizon

Value: 6 or 7 or variegated dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loamy sand, sand, coarse sand, or loamy coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 0 to 50 percent—0 to 25 percent cobbles; 0 to 25 percent pebbles

Reaction: pH 7.4 to 8.4

519A—Greycliff loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,000 to 4,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Greycliff and similar soils: 90 percent

Minor Components

Rivra gravelly sandy loam: 0 to 5 percent

Threeriv loam: 0 to 3 percent

Slickspots: 0 to 2 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 5.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

528A—Greycliff-Lamoose silt loams, 0 to 2 percent slopes

Setting

Landform:

- Greycliff—Stream terraces
- Lamoose—Stream terraces

Slope:

- Greycliff—0 to 2 percent
- Lamoose—0 to 2 percent

Elevation: 4,150 to 4,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Greycliff and similar soils: 60 percent

Lamoose and similar soils: 30 percent

Minor Components

Reycreek loam: 0 to 5 percent

Threeriv loam: 0 to 5 percent

Major Component Description

Greycliff

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 5.7 inches

Lamoose

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

526A—Greycliff-Rivra-Threeriv complex, 0 to 2 percent slopes

Setting

Landform:

- Greycliff—Stream terraces
- Rivra—Stream terraces
- Threeriv—Stream terraces

Slope:

- Greycliff—0 to 2 percent
- Rivra—0 to 2 percent
- Threeriv—0 to 2 percent

Elevation: 4,000 to 4,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Greycliff and similar soils: 40 percent

Rivra and similar soils: 25 percent

Threeriv and similar soils: 20 percent

Minor Components

Emyd loam: 0 to 8 percent

Toston loam: 0 to 5 percent

Slickspots: 0 to 2 percent

Major Component Description

Greycliff

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 5.7 inches

Rivra

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 2.0 inches

Threeriv

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Available water capacity: Mainly 5.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

525A—Greycliff-Toston-Threeriv complex, 0 to 2 percent slopes**Setting***Landform:*

- Greycliff—Stream terraces
- Toston—Stream terraces
- Threeriv—Stream terraces

Slope:

- Greycliff—0 to 2 percent
- Toston—0 to 2 percent
- Threeriv—0 to 2 percent

Elevation: 4,000 to 4,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition**Major Components**

Greycliff and similar soils: 60 percent

Toston and similar soils: 20 percent

Threeriv and similar soils: 10 percent

Minor Components

Reycreek loam: 0 to 5 percent

Rivra gravelly sandy loam: 0 to 3 percent

Slickspots: 0 to 2 percent

Major Component Description**Greycliff**

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 5.7 inches

Toston

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.5 inches

Threeriv

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Water table: Apparent
Available water capacity: Mainly 5.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Hanson Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Mountains, hills, alluvial fans, and stream terraces
Parent material: Limestone colluvium or limestone alluvium
Slope range: 8 to 45 percent
Elevation range: 4,400 to 7,650 feet
Annual precipitation: 17 to 24 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, carbonatic Calcic Haplocryolls

Typical Pedon

Hanson loam, 8 to 25 percent slopes, in an area of forest land, 1,800 feet south and 100 feet east of the northwest corner of sec. 33, T. 5 N., R. 6 E.

Oa—0 to 1 inch; decomposed forest litter.

A1—1 to 7 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

A2—7 to 15 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 5 percent cobbles; neutral; clear smooth boundary.

Bk1—15 to 22 inches; light brownish gray (10YR 6/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine, fine, and medium roots; 10 percent cobbles and 30 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—22 to 60 inches; light brownish gray (10YR 6/2) very gravelly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; 10 percent cobbles and 35 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 15 inches

Depth to the Bk horizon: 8 to 16 inches

A1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 15 to 27 percent

Content of rock fragments: 5 to 50 percent—0 to 10 percent boulders or stones; 0 to 20 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 8.4

A2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 55 percent—0 to 10 percent stones; 5 to 25 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 8.4

Bk1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5 or 6 moist

Chroma: 2, 3, or 4

Clay content: 18 to 27 percent

Content of rock fragments: 35 to 65 percent—0 to 5 percent stones; 10 to 30 percent cobbles; 25 to 35 percent pebbles

Calcium carbonate equivalent: 30 to 40 percent in the less than 2 mm fraction and more than 40 percent in the less than 20 mm fraction

Reaction: pH 7.4 to 8.4

Bk2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5 or 6 moist

Chroma: 2, 3, or 4

Clay content: 18 to 27 percent

Content of rock fragments: 35 to 65 percent—0 to 5 percent stones; 10 to 25 percent cobbles; 25 to 35 percent pebbles

Calcium carbonate equivalent: 40 to 60 percent

Reaction: pH 7.4 to 8.4

81E—Hanson cobbly loam, 15 to 45 percent slopes, stony

Setting

Landform: Hills

Slope: 15 to 45 percent

Elevation: 5,600 to 6,100 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Hanson and similar soils: 90 percent

Minor Components

Soils less than 20 inches deep to bedrock: 0 to 5 percent

Adel loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

481E—Hanson loam, 8 to 25 percent slopes

Setting

Landform: Mountains

Slope: 8 to 25 percent

Elevation: 5,350 to 7,650 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Hanson and similar soils: 85 percent

Minor Components

Hanson very stony loam: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to 5 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

381E—Hanson, bouldery-Bridger complex, 8 to 25 percent slopes

Setting

Landform:

- Hanson—Alluvial fans and stream terraces
- Bridger—Drainageways

Slope:

- Hanson—8 to 25 percent
- Bridger—8 to 25 percent

Elevation: 5,250 to 6,000 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Hanson and similar soils: 75 percent

Bridger and similar soils: 15 percent

Minor Components

Adel loam: 0 to 5 percent

Philipsburg stony loam: 0 to 5 percent

Major Component Description

Hanson

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.9 inches

Bridger

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

491E—Hanson-Whitore, stony complex, 15 to 45 percent slopes

Setting

Landform:

- Hanson—Mountains
- Whitore—Mountains

Slope:

- Hanson—15 to 45 percent
- Whitore—15 to 45 percent

Elevation: 4,400 to 7,450 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Hanson and similar soils: 55 percent

Whitore and similar soils: 30 percent

Minor Components

Soils less than 40 inches deep to bedrock: 0 to 8 percent

Accola loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Hanson

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.8 inches

Whitore

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Havre Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,150 to 4,900 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, calcareous, frigid Aridic Ustifluvents

Typical Pedon

Havre loam, in an area of Havre loam, calcareous surface, 0 to 2 percent slopes, in an area of hayland, 900 feet north and 1,800 feet west of the southeast corner of sec. 6, T. 1 S., R. 1 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate fine angular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many fine and very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C1—8 to 29 inches; pale brown (10YR 6/3) loam consisting of thin strata of silt loam and fine sandy loam, dark brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—29 to 60 inches; light brownish gray (2.5Y 6/2) silt loam consisting of thin strata of loam and fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 10 to 27 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 6.1 to 8.4

C horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Loam, silt loam, or clay loam consisting of thin strata of fine sandy loam, silt loam, or loam

Clay content: 18 to 35 percent

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

102A—Havre loam, 0 to 2 percent slopes, rare flooding

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Elevation: 4,150 to 4,800 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Havre and similar soils: 90 percent

Minor Components

Glendive sandy loam: 0 to 5 percent
 Straw loam: 0 to 3 percent
 Fairway loam: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: Rare
Available water capacity: Mainly 9.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

2A—Havre loam, calcareous surface, 0 to 2 percent slopes

Setting

Landform: Flood plains
Slope: 0 to 2 percent
Elevation: 4,150 to 4,900 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Havre and similar soils: 85 percent

Minor Components

Fairway loam: 0 to 5 percent
 Havre clay loam: 0 to 5 percent
 Ryell fine sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland

Flooding: Rare
Available water capacity: Mainly 9.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Headwaters Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Landform: Hills or sedimentary plains
Parent material: Semiconsolidated, loamy sedimentary beds
Slope range: 2 to 15 percent
Elevation range: 4,150 to 5,300 feet
Annual precipitation: 10 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Calcicustolls

Typical Pedon

Headwaters cobbly loam, 2 to 8 percent slopes, in an area of cropland, 2,800 feet south and 1,000 feet west of the northeast corner of sec. 25 T. 1 N., R. 1 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 10 percent cobbles and 10 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

A2—5 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, and moderately plastic; common very fine and fine and few medium roots; slightly effervescent; neutral; clear wavy boundary.

Bk—7 to 29 inches; light gray (10YR 7/2) clay loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and few fine and medium roots; common medium masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Cr—29 to 60 inches; pale yellow (2.5Y 7/4) weakly consolidated sedimentary beds that crush to a silty clay loam, (interbedded with semiconsolidated, sandy materials) light yellowish brown (2.5Y 6/4) moist; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 13 inches

Depth to the Bk horizon: 5 to 13 inches

Depth to the Cr horizon: 20 to 40 inches

Ap horizon

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Clay content: 18 to 27 percent

Calcium carbonate equivalent: 5 to 15 percent

Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

A2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Calcium carbonate equivalent: 5 to 15 percent

Content of rock fragments: 0 to 25 percent—0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 9.0

Note: In some pedons this horizon consists of stratified silty clay loam and sandy clay loam.

220C—Headwaters cobbly loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains

Slope: 2 to 8 percent

Elevation: 4,150 to 4,600 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Headwaters and similar soils: 85 percent

Minor Components

Cabbart loam: 0 to 5 percent

Headwaters very cobbly loam: 0 to 5 percent

Trimad very cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

20C—Headwaters loam, 2 to 8 percent slopes

Setting

Landform: Sedimentary plains

Slope: 2 to 8 percent

Elevation: 4,200 to 5,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Headwaters and similar soils: 85 percent

Minor Components

Amesha loam: 0 to 5 percent

Cabbart loam: 0 to 5 percent

Tanna clay loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

20D—Headwaters loam, 8 to 15 percent slopes

Setting

Landform: Hills

Slope: 8 to 15 percent

Elevation: 4,200 to 5,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Headwaters and similar soils: 85 percent

Minor Components

Amesha loam: 0 to 5 percent

Cabbart loam: 0 to 5 percent

Tanna clay loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Hoppers Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Hills

Parent material: Interbedded sandstone and shale residuum

Slope range: 15 to 60 percent

Elevation range: 4,900 to 7,100 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 37 to 43 degrees F

Frost-free period: 80 to 100 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Hoppers sandy clay loam, in an area of Hoppers, stony-Tolbert, very stony-Timberlin complex, 35 to 60 percent slopes, in an area of forest land, 900 feet north and 1,320 feet east of the southwest corner of sec. 9, T. 2 S., R. 7 E.

A—0 to 8 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine, fine, and medium and few coarse roots; 2 percent cobbles and 10 percent pebbles, neutral; clear smooth boundary.

Bt1—8 to 15 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, friable, slightly sticky, and slightly plastic; common fine and medium and few coarse roots; common distinct clay films on faces of peds; 5 percent pebbles; neutral; clear smooth boundary.

Bt2—15 to 26 inches; brown (10YR 5/3) sandy clay loam; dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and slightly plastic; common fine and medium and few coarse roots; common distinct clay films on faces of peds; 10 percent pebbles; neutral; clear smooth boundary.

Cr—26 to 33 inches; olive (5Y 5/3) semiconsolidated and weathered sandstone.

R—33 inches; hard sandstone.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the R horizon: 20 to 40 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Sandy clay loam or loam
 Clay content: 18 to 30 percent
 Content of rock fragments: 0 to 15 percent—0 to 3 percent stones; 0 to 5 percent cobbles; 0 to 10 percent pebbles
 Reaction: pH 6.6 to 7.3

Bt1 horizon

Value: 4 or 5 dry; 3 or 4 moist
 Chroma: 2 or 3
 Texture: Sandy clay loam or clay loam
 Clay content: 25 to 35 percent
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent pebbles
 Reaction: pH 6.6 to 7.3

Bt2 horizon

Value: 4 or 5 dry
 Chroma: 3 or 4
 Texture: Sandy clay loam or clay loam
 Clay content: 25 to 35 percent
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent pebbles
 Reaction: pH 6.6 to 7.3

847F—Hoppers, stony-Tolbert, very stony-Rock outcrop complex, 35 to 60 percent slopes

Setting

Landform:

- Hoppers—Hills
- Tolbert—Hills
- Rock outcrop—Hills

Slope:

- Hoppers—35 to 60 percent
- Tolbert—35 to 60 percent

Elevation: 4,900 to 6,850 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Hoppers and similar soils: 45 percent

Tolbert and similar soils: 25 percent

Rock outcrop: 20 percent

Minor Components

Farnuf loam: 0 to 5 percent

Soils with slopes more than 60 percent: 0 to 5 percent

Major Component Description

Hoppers

Surface layer texture: Sandy clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.0 inches

Tolbert

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.8 inches

Rock outcrop

Definition: Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

647E—Hoppers, stony-Tolbert, very stony-Timberlin complex, 15 to 35 percent slopes

Setting

Landform:

- Hoppers—Hills, south aspects
- Tolbert—Hills, south aspects
- Timberlin—Hills, north aspects

Slope:

- Hoppers—15 to 35 percent
- Tolbert—15 to 35 percent
- Timberlin—15 to 35 percent

Elevation: 4,900 to 7,100 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Hoppers and similar soils: 50 percent

Tolbert and similar soils: 20 percent

Timberlin and similar soils: 20 percent

Minor Components

Adel loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Hoppers

Surface layer texture: Sandy clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.0 inches

Tolbert

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.8 inches

Timberlin

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

647F—Hoppers, stony-Tolbert, very stony-Timberlin complex, 35 to 60 percent slopes

Setting

Landform:

- Hoppers—Hills, south aspects
- Tolbert—Hills, south aspects
- Timberlin—Hills, north aspects

Slope:

- Hoppers—35 to 60 percent
- Tolbert—35 to 60 percent
- Timberlin—35 to 60 percent

Elevation: 5,200 to 7,000 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Hoppers and similar soils: 40 percent

Tolbert and similar soils: 25 percent

Timberlin and similar soils: 25 percent

Minor Components

Blaincreek stony loam: 0 to 5 percent

Rock outcrop: 0 to 5 percent

Major Component Description

Hoppers

Surface layer texture: Sandy clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.0 inches

Tolbert

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.8 inches

Timberlin

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

547E—Hoppers-Adel-Tolbert, very stony complex, 15 to 45 percent slopes

Setting

Landform:

- Hoppers—Hills
- Adel—Hills
- Tolbert—Hills

Slope:

- Hoppers—15 to 45 percent
- Adel—15 to 45 percent
- Tolbert—15 to 45 percent

Elevation: 4,950 to 6,000 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Hoppers and similar soils: 40 percent

Adel and similar soils: 25 percent

Tolbert and similar soils: 20 percent

Minor Components

Blaincreek loam: 0 to 10 percent

Soils with slopes more than 45 percent: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Hoppers

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.2 inches

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 10.8 inches

Tolbert

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Hyalite Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow above the 3C horizon and rapid in the 3C horizon

Landform: Alluvial fans or stream terraces

Parent material: Alluvium

Slope range: 0 to 4 percent

Elevation range: 4,350 to 6,150 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Hyalite loam, in an area of Hyalite-Beaverton complex, 0 to 4 percent slopes, in an area of hayland, 100 feet south and 300 feet east of the northwest corner of sec. 13, T. 3 S., R. 4 E.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent cobbles and 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—5 to 8 inches; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt2—8 to 17 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots;

common distinct clay films on faces of peds; 5 percent cobbles and 10 percent pebbles; neutral; gradual wavy boundary.

2Bt3—17 to 26 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; loose, slightly sticky, and slightly plastic; common very fine and few fine and medium roots; few faint clay films on faces of peds; 30 percent cobbles and 25 percent pebbles; neutral; clear wavy boundary.

3C—26 to 60 inches; variegated very cobbly loamy sand; massive; loose, nonsticky, and nonplastic; common very fine and few fine and medium roots; 30 percent cobbles and 30 percent pebbles; common distinct lime casts on undersides of coarse fragments; neutral.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the 2Bt3 horizon: 11 to 22 inches

Ap horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.1 to 7.3

Note: Some horizons may have a clay loam Ap horizon when cultivated.

Bt1 horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Clay loam, loam, or silty clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bt2 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Texture: Clay loam, silty clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 10 to 35 percent—5 to 10 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

2Bt3 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Texture: Sandy clay loam, sandy loam, or coarse sandy loam

Clay content: 10 to 25 percent

Content of rock fragments: 40 to 75 percent—20 to 35 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

3C horizon

Texture: Loamy sand, sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 75 percent—20 to 35 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.8

748A—Hyalite-Beaverton complex, 0 to 4 percent slopes

Setting

Landform:

- Hyalite—Alluvial fans and stream terraces
- Beaverton—Alluvial fans and stream terraces

Slope:

- Hyalite—0 to 4 percent
- Beaverton—0 to 4 percent

Elevation: 4,350 to 6,150 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Hyalite and similar soils: 70 percent

Beaverton and similar soils: 20 percent

Minor Components

Soils with slopes more than 4 percent: 0 to 5 percent

Turner loam: 0 to 5 percent

Major Component Description

Hyalite

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.3 inches

Beaverton

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

448A—Hyalite-Beaverton complex, moderately wet, 0 to 2 percent slopes

Setting

Landform:

- Hyalite—Alluvial fans and stream terraces
- Beaverton—Alluvial fans and stream terraces

Slope:

- Hyalite—0 to 2 percent
- Beaverton—0 to 2 percent

Elevation: 4,450 to 5,300 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Hyalite and similar soils: 70 percent

Beaverton and similar soils: 20 percent

Minor Components

Beaverton very cobbly loam: 0 to 5 percent

Meadowcreek loam: 0 to 5 percent

Major Component Description

Hyalite

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 4.3 inches

Beaverton

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 3.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Jaegie Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Mountains

Parent material: Gneiss or schist colluvium or igneous colluvium

Slope range: 8 to 60 percent

Elevation range: 5,200 to 7,100 feet

Annual precipitation: 20 to 30 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Eutric Haplocryalfs

Typical Pedon

Jaegie gravelly coarse sandy loam, in an area of Jaegie-Shadow, stony complex, 15 to 45 percent slopes, in an area of forest land, 2,300 feet south and 2,000 feet west of the northeast corner of sec. 4, T. 3 S., R. 6 E.

Oi—0 to 2 inches; slightly decomposed forest debris.

A—2 to 4 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and common medium roots; many very fine and common fine pores; 5 percent cobbles and 20 percent pebbles; slightly acid; clear smooth boundary.

E—4 to 15 inches; yellowish brown (10YR 5/4) gravelly coarse sandy loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; many very fine and common fine pores; 5 percent cobbles and 10 percent pebbles; moderately acid; clear smooth boundary.

E/Bt—15 to 25 inches; E part (60 percent) is yellowish brown (10YR 5/4) gravelly coarse sandy loam, brown (10YR 4/3) moist; Bt part (40 percent) is yellowish brown (10YR 5/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, and nonplastic;

common very fine and fine and few medium roots; many very fine and common fine pores; few faint clay films on faces of peds and pebbles; 5 percent cobbles and 15 percent pebbles; moderately acid; clear wavy boundary.

Bt—25 to 43 inches; yellowish brown (10YR 5/4) gravelly sandy clay loam; dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; many very fine and common fine pores; common distinct clay films on faces of peds and pebbles; 5 percent cobbles and 20 percent pebbles; moderately acid; clear wavy boundary.

C—43 to 60 inches; yellowish brown (10YR 5/4) gravelly coarse sandy loam; dark yellowish brown (10YR 4/4) moist; massive; loose, nonsticky, and nonplastic; few very fine and fine roots; many very fine and fine and common medium pores; 5 percent cobbles and 20 percent pebbles; moderately acid.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

A horizon

Value: 3 or 4 moist

Chroma: 3 or 4

Texture: Coarse sandy loam or loam

Clay content: 10 to 20 percent

Content of rock fragments: 10 to 30 percent—0 to 10 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

E horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 3, 4, or 6

Texture: Coarse sandy loam or loam

Clay content: 10 to 20 percent

Content of rock fragments: 10 to 30 percent—0 to 10 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

E/Bt horizon

Value: E part 5 or 6 dry; 3 or 4 moist; Bt part 4 or 5 dry; 3, 4, or 5 moist

Chroma: 3 to 6

Texture: Coarse sandy loam or sandy clay loam (mixed)

Clay content: 18 to 30 percent

Content of rock fragments: 10 to 30 percent—0 to 10 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 5.6 to 6.5

Bt horizon

Value: 4 or 5 dry; 3, 4, or 5 moist

Chroma: 4 or 6

Clay content: 22 to 35 percent

Content of rock fragments: 10 to 35 percent—0 to 10 percent cobbles; 10 to 25 percent pebbles

Reaction: pH 5.6 to 6.5

C horizon

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 4 to 6

Texture: Sandy loam or coarse sandy loam

Clay content: 10 to 20 percent

Content of rock fragments: 10 to 35 percent—0 to 10 percent cobbles; 10 to 25 percent pebbles

Reaction: pH 5.6 to 6.5

190E—Jaegie gravelly coarse sandy loam, 8 to 35 percent slopes

Setting

Landform: Mountains

Slope: 8 to 35 percent

Elevation: 5,200 to 6,850 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Jaegie and similar soils: 90 percent

Minor Components

Shadow stony coarse sandy loam: 0 to 5 percent

Bavdark loam, moist: 0 to 4 percent

Mooseflat loam: 0 to 1 percent

Major Component Description

Surface layer texture: Gravelly coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

290E—Jaegie loam, 15 to 35 percent slopes

Setting

Landform: Mountains
Slope: 15 to 35 percent
Elevation: 5,800 to 6,550 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Jaegie and similar soils: 90 percent

Minor Components

Cowood very stony loam: 0 to 3 percent
 Timberlin stony loam: 0 to 3 percent
 Rock outcrop: 0 to 2 percent
 Soils with slopes more than 35 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Igneous colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

90F—Jaegie loam, 35 to 60 percent slopes

Setting

Landform: Mountains
Slope: 35 to 60 percent
Elevation: 5,800 to 7,100 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Jaegie and similar soils: 85 percent

Minor Components

Cowood very stony loam: 0 to 5 percent
 Rubble land: 0 to 5 percent
 Shadow stony coarse sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Gneiss or schist colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

590E—Jaegie-Shadow, stony complex, 15 to 45 percent slopes

Setting

Landform:
 • Jaegie—Mountains
 • Shadow—Mountains
Slope:
 • Jaegie—15 to 25 percent
 • Shadow—15 to 45 percent
Elevation: 5,300 to 6,500 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Jaegie and similar soils: 70 percent
 Shadow and similar soils: 20 percent

Minor Components

Bavdark loam, moist: 0 to 5 percent
 Cowood channery sandy loam: 0 to 3 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Jaegie

Surface layer texture: Gravelly coarse sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Gneiss or schist colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 6.6 inches

Shadow

Surface layer texture: Very cobbly coarse sandy loam
Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained
Dominant parent material: Gneiss or schist colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

890E—Jaegie-Shadow, stony complex, cool, 15 to 45 percent slopes

Setting

Landform:

- Jaegie—Mountains
- Shadow—Mountains

Slope:

- Jaegie—15 to 45 percent
- Shadow—15 to 45 percent

Elevation: 5,900 to 6,950 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Jaegie and similar soils: 60 percent

Shadow and similar soils: 25 percent

Minor Components

Soils with slopes more than 45 percent: 0 to 8 percent

Cowood channery sandy loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Jaegie

Surface layer texture: Gravelly coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.6 inches

Shadow

Surface layer texture: Very cobbly coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Kalsted Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately rapid

Landform: Alluvial fans, relict stream terraces, stream terraces, or escarpments

Parent material: Colluvium or alluvium

Slope range: 0 to 45 percent

Elevation range: 3,950 to 5,400 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Aridic Calcustepts

Typical Pedon

Kalsted sandy loam, 0 to 4 percent slopes, in an area of cropland, 1,000 feet north and 800 feet east of the southwest corner of sec. 1, T. 1 N., R. 2 E.

Ap—0 to 6 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine roots; common very fine pores; 5 percent pebbles; violently effervescent; moderately alkaline; clear smooth boundary.

Bk1—6 to 15 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine roots; common very fine pores; 5 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—15 to 26 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine roots; common very fine pores; 10 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk3—26 to 42 inches; very pale brown (10YR 7/4) sandy loam, brown (10YR 5/3) moist; single grain; loose, very friable, nonsticky, and nonplastic; few very fine roots; common very fine and fine pores; 10 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; diffuse smooth boundary.

BC—42 to 60 inches; very pale brown (10YR 7/3) sandy loam, light brownish gray (10YR 6/3) moist; massive; loose, nonsticky, and nonplastic; common very fine and fine pores; 10 percent pebbles; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Depth to the Bk horizon: 6 to 12 inches

Ap horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 35 percent—0 to

15 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 8.4

Bk1 horizon

Value: 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2 or 3

Texture: Sandy loam or fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 35 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

Bk2 and Bk3 horizons

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Sandy loam with lenses of loamy sand

Clay content: 5 to 18 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent cobbles; 5 to 30 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

BC horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Sandy loam with lenses of loamy sand

Clay content: 5 to 15 percent

Content of rock fragments: 10 to 35 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

135E—Kalsted gravelly sandy loam, 15 to 35 percent slopes

Setting

Landform: Escarpments

Slope: 15 to 35 percent

Elevation: 3,950 to 5,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Kalsted and similar soils: 85 percent

Minor Components

Blacksheep sandy loam: 0 to 5 percent

Scravo cobbly sandy loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

35B—Kalsted sandy loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans

Slope: 0 to 4 percent

Elevation: 3,950 to 4,850 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Kalsted and similar soils: 85 percent

Minor Components

Kalsted cobbly sandy loam: 0 to 5 percent
 Soils with slopes more than 4 percent: 0 to 5 percent
 Trimad cobbly sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**35C—Kalsted sandy loam,
4 to 8 percent slopes****Setting**

Landform: Relict stream terraces and alluvial fans
Slope: 4 to 8 percent
Elevation: 4,000 to 5,050 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition**Major Components**

Kalsted and similar soils: 85 percent

Minor Components

Chinook sandy loam: 0 to 5 percent
 Kalsted cobbly sandy loam: 0 to 5 percent
 Trimad cobbly sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**35D—Kalsted sandy loam,
8 to 15 percent slopes****Setting**

Landform: Relict stream terraces and alluvial fans
Slope: 8 to 15 percent
Elevation: 4,000 to 5,000 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition**Major Components**

Kalsted and similar soils: 85 percent

Minor Components

Musselshell loam: 0 to 5 percent
 Soils with slopes more than 15 percent: 0 to 5 percent
 Trimad cobbly sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Kelstrup Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Relict stream terraces
Parent material: Loess
Slope range: 0 to 15 percent
Elevation range: 4,150 to 5,550 feet
Annual precipitation: 12 to 16 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Aridic Haplustolls

Typical Pedon

Kelstrup silt loam, 4 to 8 percent slopes, in an area of cropland, 1,300 feet south and 1,100 feet west of the northeast corner of sec. 6, T. 2 N., R. 3 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; few very fine and fine tubular pores; slightly alkaline; abrupt smooth boundary.

Bw1—5 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; few very fine tubular and interstitial pores; slightly alkaline; gradual wavy boundary.

Bw2—8 to 14 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, and nonplastic; common very fine roots; few very fine tubular pores; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk1—14 to 28 inches; light gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; soft, very friable, slightly sticky, and nonplastic; few very fine roots; few very fine tubular and interstitial pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—28 to 60 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; few very fine roots; few very fine tubular and interstitial pores; disseminated lime; few fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 10 inches

Depth to the Bk horizon: 11 to 20 inches

Ap horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

Bw horizons

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 12 to 20 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 7.4 to 8.4

Bk horizons

Value: 6 or 7 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

31C—Kelstrup silt loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces

Slope: 4 to 8 percent

Elevation: 4,200 to 5,400 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Kelstrup and similar soils: 85 percent

Minor Components

Amsterdam silt loam: 0 to 5 percent

Brocko silt loam: 0 to 5 percent

Kalsted sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 11.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

31D—Kelstrup silt loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces

Slope: 8 to 15 percent

Elevation: 4,150 to 5,550 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Kelstrup and similar soils: 85 percent

Minor Components

Amsterdam silt loam: 0 to 5 percent

Brocko silt loam: 0 to 5 percent

Kalsted sandy loam: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 11.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

431B—Kelstrup-Brocko silt loams, 0 to 4 percent slopes

Setting

Landform:

- Kelstrup—Relict stream terraces
- Brocko—Relict stream terraces

Slope:

- Kelstrup—0 to 4 percent
- Brocko—0 to 4 percent

Elevation: 4,200 to 5,050 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Kelstrup and similar soils: 65 percent

Brocko and similar soils: 20 percent

Minor Components

Kalsted gravelly sandy loam: 0 to 5 percent

Soils with slopes more than 4 percent: 0 to 5 percent

Trimad cobbly sandy loam: 0 to 5 percent

Major Component Description

Kelstrup

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 11.0 inches

Brocko

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

431C—Kelstrup-Brocko silt loams, 4 to 8 percent slopes

Setting

Landform:

- Kelstrup—Relict stream terraces
- Brocko—Relict stream terraces

Slope:

- Kelstrup—4 to 8 percent
- Brocko—4 to 8 percent

Elevation: 4,200 to 5,250 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Kelstrup and similar soils: 65 percent
Brocko and similar soils: 20 percent

Minor Components

Kalsted gravelly sandy loam: 0 to 5 percent
Soils with slopes more than 8 percent: 0 to 5 percent
Trimad cobbly sandy loam: 0 to 5 percent

Major Component Description

Kelstrup

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.0 inches

Brocko

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

431D—Kelstrup-Brocko silt loams, 8 to 15 percent slopes

Setting

Landform:

- Kelstrup—Relict stream terraces
- Brocko—Relict stream terraces

Slope:

- Kelstrup—8 to 15 percent
- Brocko—8 to 15 percent

Elevation: 4,350 to 5,050 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Kelstrup and similar soils: 55 percent
Brocko and similar soils: 35 percent

Minor Components

Kalsted gravelly sandy loam: 0 to 5 percent
Trimad cobbly sandy loam: 0 to 3 percent
Soils with slopes more than 15 percent: 0 to 2 percent

Major Component Description

Kelstrup

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.0 inches

Brocko

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Lamoose Series

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Permeability: Moderate in the A and B horizons and rapid below

Landform: Stream terraces and flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,000 to 5,000 feet

Annual precipitation: 10 to 18 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 115 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid
Typic Endoaquolls

Typical Pedon

Lamoose silt loam, 0 to 2 percent slopes, in an area of pasture, 300 feet south and 2,300 feet west of the northeast corner of sec. 34, T. 2 N., R. 3 E.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bg1—9 to 22 inches; dark gray (5Y 4/1) silt loam, grayish brown (2.5Y 5/2) dry; strong fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; slightly effervescent; slightly alkaline; clear smooth boundary.

Bg2—22 to 27 inches; dark gray (5Y 4/1) silt loam, grayish brown (2.5Y 5/2) dry with stratified lenses of strong brown (7.5YR 4/6) loamy sand; strong fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; slightly effervescent; neutral; abrupt irregular boundary.

2C—27 to 60 inches; variegated extremely gravelly loamy sand; single grain; loose, nonsticky, and nonplastic; few very fine roots; 15 percent cobbles and 50 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 12 inches

Depth to seasonal high water table: 12 to 24 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

Bg horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 1 or 2

Texture: Loam or silt loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent pebbles

Reaction: pH 6.6 to 7.8

2C horizon

Texture: Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 70 percent—0 to 15 percent cobbles; 35 to 55 percent pebbles

Reaction: pH 6.6 to 7.8

537A—Lamoose silt loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,000 to 5,000 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Lamoose and similar soils: 85 percent

Minor Components

Bonebasin loam: 0 to 10 percent

Meadowcreek loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

541A—Lamoose-Rivra-Bonebasin complex, 0 to 2 percent slopes

Setting

Landform:

- Lamoose—Flood plains
- Rivra—Flood plains
- Bonebasin—Flood plains

Slope:

- Lamoose—0 to 2 percent
- Rivra—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 4,000 to 4,700 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Lamoose and similar soils: 50 percent

Rivra and similar soils: 25 percent

Bonebasin and similar soils: 15 percent

Minor Components

Ryell sandy loam: 0 to 5 percent

Threeriv loam: 0 to 5 percent

Major Component Description

Lamoose

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 5.5 inches

Rivra

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 2.0 inches

Bonebasin

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Lap Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Mountains and hills

Parent material: Limestone residuum

Slope range: 8 to 60 percent

Elevation range: 4,150 to 7,300 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal, carbonatic, frigid
Lithic Calciustolls

Typical Pedon

Lap very cobbly loam, in an area of Windham, stony, moist-Lap, very stony-Hanson complex, 15 to 45 percent slopes, in an area of rangeland, 500 feet north and 2,000 feet east of the southwest corner of sec. 4, T. 3 N., R. 4 E.

A—0 to 5 inches; very dark gray (10YR 3/1) very cobbly loam, black (10YR 2/1) moist; moderate fine subangular blocky parting to moderate fine granular structure; soft, friable, slightly sticky, and nonplastic; many very fine and fine and few medium roots; 5 percent stones, 25 percent cobbles, and 15 percent pebbles; slightly alkaline; clear wavy boundary.

Bw—5 to 11 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, friable, slightly sticky, and nonplastic; many very fine and common fine and medium roots; 5 percent stones, 25 percent cobbles, and 20 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk—11 to 16 inches; grayish brown (10YR 5/2) extremely gravelly loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, and nonplastic; common

very fine and few fine and medium roots; 5 percent stones, 25 percent cobbles, and 35 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

R—16 inches; hard limestone bedrock.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 12 inches

Depth to bedrock: 10 to 20 inches

Depth to the Bk horizon: 4 to 12 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 30 to 55 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 10 to 20 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 7.4 to 7.8

Bw horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4, 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Clay content: 20 to 27 percent

Content of rock fragments: 30 to 55 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 15 to 25 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 50 to 75 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 30 to 40 percent pebbles

Calcium carbonate equivalent: 40 to 60 percent

Reaction: pH 7.9 to 8.4

666F—Lap-Windham-Rock outcrop complex, 35 to 60 percent slopes

Setting

Landform:

- Lap—Hills
- Windham—Hills

- Rock outcrop—Hills

Slope:

- Lap—35 to 60 percent

- Windham—35 to 60 percent

Elevation: 4,150 to 6,550 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Lap and similar soils: 50 percent

Windham and similar soils: 25 percent

Rock outcrop: 15 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 5 percent

Windham stony loam, moist: 0 to 5 percent

Major Component Description

Lap

Surface layer texture: Very cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Limestone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.1 inches

Windham

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.2 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Libeg Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Hills, escarpments, outwash plains, relict stream terraces, stream terraces, and alluvial fans

Parent material: Alluvium, sandstone colluvium, or alpine till

Slope range: 0 to 60 percent

Elevation range: 5,100 to 7,400 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Argicryolls

Typical Pedon

Libeg cobbly loam, 0 to 4 percent slopes, in an area of rangeland, 1,200 feet south and 100 feet west of the northeast corner of sec. 2, T. 7 S., R. 3 E.

A—0 to 7 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; 15 percent cobbles and 15 percent pebbles; neutral; clear smooth boundary.

Bt1—7 to 22 inches; dark grayish brown (10YR 4/2) very gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky, and nonplastic; common distinct clay films on faces of ped; 15 percent cobbles and 45 percent pebbles; neutral; gradual wavy boundary.

Bt2—22 to 45 inches; brown (10YR 5/3) extremely cobbly sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common distinct clay films on faces of ped; 40 percent cobbles and 25 percent pebbles; slightly alkaline; clear wavy boundary.

BC—45 to 60 inches; grayish brown (10YR 5/2) extremely cobbly sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, and nonplastic; 35 percent cobbles and 30 percent pebbles; few faint lime coatings on coarse fragments; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

A horizon

Hue: 7.5YR or 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 25 to 60 percent—0 to 10 percent stones; 10 to 25 percent cobbles; 15 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

Bt horizons

Hue: 5YR, 7.5YR, or 10YR

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, 4, or 6

Texture: Loam, sandy clay loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 35 to 80 percent—0 to 20 percent stones; 20 to 40 percent cobbles; 25 to 45 percent pebbles

Reaction: pH 6.1 to 7.8

BC horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, 4, or 6

Texture: Loam, sandy loam, clay loam, or sandy clay loam

Clay content: 15 to 35 percent

Content of rock fragments: 40 to 70 percent—0 to 20 percent stones; 20 to 35 percent cobbles; 20 to 35 percent pebbles

Reaction: pH 7.4 to 7.8

280B—Libeg cobbly loam, 0 to 4 percent slopes

Setting

Landform: Outwash plains

Slope: 0 to 4 percent

Elevation: 5,600 to 6,550 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Libeg and similar soils: 85 percent

Minor Components

Adel loam: 0 to 5 percent

Libeg very cobbly loam: 0 to 5 percent

Philipsburg loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

380D—Libeg cobbly loam, 8 to 15 percent slopes, stony

Setting

Landform: Alluvial fans and stream terraces

Slope: 8 to 15 percent

Elevation: 5,350 to 7,350 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Libeg and similar soils: 85 percent

Minor Components

Libeg extremely stony loam: 0 to 10 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

380E—Libeg cobbly loam, 15 to 35 percent slopes, stony

Setting

Landform: Alluvial fans and stream terraces

Slope: 15 to 35 percent

Elevation: 5,200 to 7,300 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Libeg and similar soils: 85 percent

Minor Components

Adel loam: 0 to 5 percent

Libeg extremely stony loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

380F—Libeg very cobbly loam, 35 to 60 percent slopes, extremely stony

Setting

Landform: Escarpments

Slope: 35 to 60 percent

Elevation: 5,850 to 6,700 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Libeg and similar soils: 85 percent

Minor Components

Adel stony loam: 0 to 10 percent

Copenhaver channery loam: 0 to 5 percent

Major Component Description

Surface layer texture: Very cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

480E—Libeg, stony-Copenhaver complex, 15 to 45 percent slopes

Setting

Landform:

- Libeg—Hills
- Copenhaver—Hills

Slope:

- Libeg—15 to 45 percent
- Copenhaver—15 to 45 percent

Elevation: 5,750 to 7,400 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Libeg and similar soils: 60 percent

Copenhaver and similar soils: 30 percent

Minor Components

Adel loam: 0 to 4 percent

Libeg extremely stony loam: 0 to 4 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Libeg

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.3 inches

Copenhaver

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Sandstone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

580E—Libeg, very stony-Copenhaver, extremely stony-Adel complex, 15 to 45 percent slopes

Setting

Landform:

- Libeg—Hills
- Copenhaver—Hills
- Adel—Hills

Slope:

- Libeg—15 to 45 percent
- Copenhaver—15 to 45 percent
- Adel—15 to 45 percent

Elevation: 5,150 to 6,500 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Libeg and similar soils: 45 percent

Copenhaver and similar soils: 30 percent

Adel and similar soils: 15 percent

Minor Components

Soils with slopes more than 45 percent: 0 to 7 percent

Rock outcrop: 0 to 3 percent

Major Component Description

Libeg

Surface layer texture: Very cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.1 inches

Copenhaver

Surface layer texture: Extremely channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Sandstone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.0 inches

Adel*Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Loberg Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Slow*Landform:* Mountains*Parent material:* Sandstone colluvium*Slope range:* 8 to 60 percent*Elevation range:* 5,300 to 8,800 feet*Annual precipitation:* 25 to 30 inches*Annual air temperature:* 34 to 38 degrees F*Frost-free period:* 30 to 70 days

Taxonomic Class: Clayey-skeletal, mixed, superactive Ustic Glossocryalfs

Typical Pedon

Loberg very flaggy loam, in an area of Loberg, very stony-Yellowmule, stony-Redlodge complex, 4 to 35 percent slopes, in an area of forest land, 1,800 feet north and 900 feet east of the southwest corner of sec. 14, T. 7 S., R. 3 E.

Oi—0 to 2 inches; slightly decomposed needles and twigs.

E1—2 to 14 inches; pale brown (10YR 6/3) very flaggy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 5 percent stones, 30 percent flagstones, and 15 percent channers; moderately acid; gradual wavy boundary.

E2—14 to 22 inches; light gray (10YR 7/2) very flaggy loam, yellowish brown (10YR 5/4) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, and nonplastic; common very fine and fine and few medium and coarse roots; 30

percent flagstones and 20 percent channers; slightly acid; gradual wavy boundary.

Bt/E—22 to 37 inches; Bt part (80 percent) pale brown (10YR 6/3) very channery clay loam, brown (10YR 5/3) moist; E part (20 percent) light gray (10YR 7/2) very channery clay loam, yellowish brown (10YR 5/4) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; 15 percent flagstones and 30 percent channers; neutral; gradual wavy boundary.

Bt—37 to 60 inches; pale brown (10YR 6/3) very channery clay loam, brown (10YR 5/3) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common distinct clay films on faces of peds; 10 percent flagstones and 35 percent channers; neutral.

Range in Characteristics*Soil temperature:* 36 to 40 degrees F*Moisture control section:* Between 4 and 12 inches*E horizons*

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Clay content: 15 to 27 percent

Content of rock fragments: 35 to 65 percent—1 to 5 percent stones; 15 to 30 percent cobbles or flagstones; 15 to 30 percent pebbles or channers

Reaction: pH 5.6 to 7.3

Bt/E horizon

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: Bt part 3, 4, or 5 moist; 4, 5, or 6 dry; E part 3, 4, or 5 moist; 5, 6, or 7 dry

Chroma: 2, 3, or 4

Clay content: 27 to 40 percent

Content of rock fragments: 35 to 60 percent—15 to 30 percent cobbles or flagstones; 20 to 30 percent pebbles or channers

Reaction: pH 5.6 to 7.3

Bt horizon

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 60 percent—10 to 30 percent cobbles or flagstones; 20 to 35 percent pebbles or channers

Reaction: pH 5.6 to 7.3

**696E—Loberg very flaggy loam,
15 to 35 percent slopes, very stony**

Setting

Landform: Mountains
Slope: 15 to 35 percent
Elevation: 7,800 to 8,800 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 30 to 55 days

Composition

Major Components

Loberg and similar soils: 85 percent

Minor Components

Redchief stony loam: 0 to 10 percent
 Danaher stony loam: 0 to 5 percent

Major Component Description

Surface layer texture: Very flaggy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandstone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**396F—Loberg very flaggy loam,
35 to 60 percent slopes, very stony**

Setting

Landform: Mountains
Slope: 35 to 60 percent
Elevation: 5,350 to 7,000 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Loberg and similar soils: 90 percent

Minor Components

Cowood very stony loam: 0 to 8 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Very flaggy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandstone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**96E—Loberg very flaggy loam, cool,
15 to 35 percent slopes, very stony**

Setting

Landform: Mountains
Slope: 15 to 35 percent
Elevation: 6,650 to 7,000 feet
Mean annual precipitation: 25 to 30 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Loberg and similar soils: 90 percent

Minor Components

Lonniebee stony loam: 0 to 5 percent
 Cowood very stony loam: 0 to 2 percent
 Danaher stony loam: 0 to 2 percent
 Rock outcrop: 0 to 1 percent

Major Component Description

Surface layer texture: Very flaggy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandstone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

396E—Loberg, very stony-Danaher, stony complex, 15 to 45 percent slopes**Setting***Landform:*

- Loberg—Mountains
- Danaher—Mountains

Slope:

- Loberg—15 to 45 percent
- Danaher—15 to 45 percent

Elevation: 5,500 to 7,000 feet*Mean annual precipitation:* 25 to 30 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Loberg and similar soils: 70 percent

Danaher and similar soils: 20 percent

Minor Components

Cowood very stony loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Loberg***Surface layer texture:* Very flaggy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 6.0 inches**Danaher***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 9.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

796E—Loberg, very stony-Yellowmule complex, 8 to 35 percent slopes**Setting***Landform:*

- Loberg—Mountains
- Yellowmule—Mountains

Slope:

- Loberg—8 to 35 percent
- Yellowmule—8 to 35 percent

Elevation: 6,600 to 7,700 feet*Mean annual precipitation:* 25 to 30 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Loberg and similar soils: 60 percent

Yellowmule and similar soils: 30 percent

Minor Components

Ouselfal very channery sandy: 0 to 5 percent

Rubble land: 0 to 3 percent

Redlodge silty clay loam: 0 to 2 percent

Major Component Description**Loberg***Surface layer texture:* Very flaggy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Sandstone colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 6.0 inches**Yellowmule***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Interbedded sandstone and shale residuum*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**596E—Loberg, very stony-Yellowmule,
stony-Redlodge complex,
4 to 35 percent slopes**

Setting

Landform:

- Loberg—Mountains
- Yellowmule—Mountains
- Redlodge—Closed depressions

Slope:

- Loberg—8 to 35 percent
- Yellowmule—8 to 35 percent
- Redlodge—4 to 6 percent

Elevation: 6,500 to 7,950 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Loberg and similar soils: 50 percent

Yellowmule and similar soils: 30 percent

Redlodge and similar soils: 10 percent

Minor Components

Soils with slopes more than 35 percent: 0 to 5 percent

Soils with a water table at 1 to 3 feet: 0 to 5 percent

Major Component Description

Loberg

Surface layer texture: Very flaggy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.0 inches

Yellowmule

Surface layer texture: Channery loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.6 inches

Redlodge

Surface layer texture: Silty clay

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 10.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Lonniebee Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Mountains and hills

Parent material: Interbedded sandstone and shale residuum

Slope range: 4 to 70 percent

Elevation range: 5,200 to 8,400 feet

Annual precipitation: 25 to 30 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Eutric Haplocryalfs

Typical Pedon

Lonniebee flaggy loam, in an area of Yellowmule-Lonniebee, stony complex, 15 to 45 percent slopes, in an area of forest land, 1,320 feet south and 1,200 feet east of the northwest corner of sec. 26, T. 2 S., R. 7 E.

Oi—0 inch to 1; slightly decomposed leaves, needles, and twigs.

E—1 to 11 inches; light brownish gray (10YR 6/2) flaggy loam, dark grayish brown (10YR 4/2) moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine, fine, and medium roots; common fine and few medium pores; 5 percent angular stones, 5 percent flagstones, and 20 percent channers; slightly acid; gradual smooth boundary.

Bt1—11 to 19 inches; brown (10YR 5/3) very flaggy clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots;

common very fine and few fine and medium pores; common faint clay films on faces of peds and channer surfaces; 25 percent flagstones and 25 percent channers; moderately acid; clear smooth boundary.

Bt2—19 to 33 inches; light yellowish brown (10YR 6/4) very flaggy clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common very fine and few fine and medium pores; common distinct clay films on faces of peds and channer surfaces; 30 percent flagstones and 25 percent channers; moderately acid; gradual wavy boundary.

Cr—33 to 38 inches; weathered and fractured sandstone bedrock.

R—38 inches; hard sandstone bedrock.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the R horizon: 20 to 40 inches

E horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 4

Texture: Loam or sandy loam

Clay content: 12 to 25 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent stones; 5 to 5 percent flagstones; 15 to 25 percent channers

Reaction: pH 5.6 to 6.5

Bt1 horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 to 6

Texture: Loam or clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 35 to 60 percent—15 to 30 percent flagstones; 20 to 30 percent channers

Reaction: pH 5.6 to 7.3

Bt2 horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 to 6

Texture: Loam or clay loam

Clay content: 22 to 35 percent

Content of rock fragments: 40 to 70 percent—20 to 35 percent flagstones; 20 to 35 percent channers

Reaction: pH 5.6 to 7.3

593E—Lonniebee-Cowood complex, 15 to 35 percent slopes

Setting

Landform:

- Lonniebee—Mountains
- Cowood—Mountains

Slope:

- Lonniebee—15 to 35 percent
- Cowood—15 to 35 percent

Elevation: 6,400 to 8,100 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Lonniebee and similar soils: 50 percent

Cowood and similar soils: 35 percent

Minor Components

Yellowmule loam: 0 to 8 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Lonniebee

Surface layer texture: Flaggy sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.0 inches

Cowood

Surface layer texture: Channery sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

593F—Lonniebee-Cowood complex, 35 to 60 percent slopes

Setting

Landform:

- Lonniebee—Mountains
- Cowood—Mountains

Slope:

- Lonniebee—35 to 60 percent
- Cowood—35 to 60 percent

Elevation: 6,050 to 8,100 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Lonniebee and similar soils: 60 percent

Cowood and similar soils: 25 percent

Minor Components

Yellowmule loam: 0 to 10 percent

Rubble land: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Lonniebee

Surface layer texture: Flaggy sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.0 inches

Cowood

Surface layer texture: Channery sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

794G—Lonniebee-Cowood complex, warm, 40 to 70 percent slopes

Setting

Landform:

- Lonniebee—Mountains
- Cowood—Mountains

Slope:

- Lonniebee—40 to 70 percent
- Cowood—40 to 70 percent

Elevation: 5,700 to 8,400 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Lonniebee and similar soils: 50 percent

Cowood and similar soils: 35 percent

Minor Components

Shadow stony sandy loam: 0 to 10 percent

Rubble land: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Lonniebee

Surface layer texture: Flaggy sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.0 inches

Cowood

Surface layer texture: Channery sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

M-W—Miscellaneous water**Composition****Major Components**

Water, miscellaneous: 100 percent

Major Component Description

Definition: Areas of sewage lagoons, industrial waste pits, fish hatcheries, etc.

Marias Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Very slow

Landform: Relict stream terraces

Parent material: Alluvium

Slope range: 4 to 8 percent

Elevation range: 4,650 to 4,800 feet

Annual precipitation: 12 to 16 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine, smectitic, frigid Chromic Haplusterts

Typical Pedon

Marias silty clay, 4 to 8 percent slopes, in an area of hayland, 1,900 feet north and 850 feet west of the southeast corner of sec. 24, T. 2 S., R. 2 E.

Ap—0 to 7 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; strong fine granular structure; very hard, very firm, moderately sticky, and very plastic; common very fine and fine roots; 1- to 2-inch wide cracks when dry; slightly effervescent; moderately alkaline; abrupt smooth boundary.

Bw—7 to 12 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure parting to moderate fine angular blocky; very hard, very firm, moderately sticky, and very plastic; common very fine and fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bss—12 to 30 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (10YR 5/2) moist; strong

medium angular blocky structure; very hard, very firm, moderately sticky, and very plastic; few fine roots; few distinct slickensides; few fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bssy—30 to 60 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (10YR 5/2) moist; strong medium angular blocky structure; very hard, very firm, moderately sticky, and very plastic; few distinct slickensides; few fine masses and threads of gypsum; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bssy horizon: 20 to 45 inches

Ap horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 40 to 60 percent

Electrical conductivity (mmhos/cm): 2 to 4

Sodium adsorption ratio: 1 to 4

Calcium carbonate equivalent: 1 to 10 percent

Reaction: pH 7.4 to 8.4

Bw and Bss horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Silty clay or clay

Clay content: 40 to 60 percent

Electrical conductivity (mmhos/cm): 2 to 4

Sodium adsorption ratio: 1 to 4

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.9 to 8.4

Bssy horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Silty clay or clay

Clay content: 40 to 60 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 4 to 13

Calcium carbonate equivalent: 5 to 10 percent

Gypsum content: 1 to 6 percent

Reaction: pH 7.9 to 8.4

19C—Marias silty clay, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces

Slope: 4 to 8 percent

Elevation: 4,650 to 4,800 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Marias and similar soils: 90 percent

Minor Components

Danvers clay loam: 0 to 5 percent

Soils with slopes more than 4 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Martab Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Mountains and escarpments

Parent material: Sandstone colluvium

Slope range: 15 to 60 percent

Elevation range: 5,000 to 7,100 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Ustollic Haplocryalfs

Typical Pedon

Martab loam, 15 to 45 percent slopes, in an area of forest land, 2,600 feet south and 1,000 feet west of the northeast corner of sec. 27, T. 5 N., R. 4 E.

Oi—0 to 2 inches; moderately decomposed leaves, needles, and twigs.

A—2 to 6 inches; very dark grayish brown (10YR 3/2) loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium and coarse roots; 5 percent pebbles; slightly acid; clear smooth boundary.

E—6 to 17 inches; reddish gray (5YR 5/2) clay loam, reddish brown (5YR 4/3) moist; moderate fine granular structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—17 to 35 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/4) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds and lining pores; 5 percent pebbles; slightly acid; clear smooth boundary.

Bt2—35 to 50 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/4) moist; strong medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common distinct clay films on faces of peds and lining pores; 15 percent soft siltstone chips; slightly effervescent; neutral; clear smooth boundary.

Bk—50 to 60 inches; reddish gray (5YR 5/2) clay loam, brown (7.5YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; 15 percent soft siltstone chips; common fine masses and seams of lime; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 35 to 60 inches

A horizon

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 20 percent—0 to 3 percent stones; 0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.8

E horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 27 to 35 percent
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
 Reaction: pH 6.1 to 7.8

Bt1 horizon

Hue: 2.5YR, 5YR, or 7.5YR
 Value: 4 or 5 dry; 3 or 4 moist
 Chroma: 3 or 4
 Texture: Clay or clay loam
 Clay content: 35 to 45 percent
 Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles
 Reaction: pH 6.1 to 7.8

Bt2 horizon

Hue: 2.5YR, 5YR, or 7.5YR
 Value: 4 or 5 dry; 3 or 4 moist
 Chroma: 3 or 4
 Texture: Clay or clay loam
 Clay content: 35 to 45 percent
 Content of rock fragments: 0 to 25 percent—0 to 5 percent cobbles; 0 to 20 percent pebbles
 Reaction: pH 6.1 to 7.8

Bk horizon

Hue: 2.5YR, 5YR, or 7.5YR
 Chroma: 2, 3, 4, or 6
 Clay content: 27 to 35 percent
 Content of rock fragments: 0 to 30 percent—0 to 10 percent cobbles; 0 to 20 percent pebbles
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 8.4

92E—Martab loam, 15 to 45 percent slopes

Setting

Landform: Mountains
Slope: 15 to 45 percent
Elevation: 5,000 to 7,100 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Martab and similar soils: 85 percent

Minor Components

Bangtail loam: 0 to 5 percent
 Martab stony loam: 0 to 5 percent
 Rocko stony loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Sandstone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

892F—Martab-Bangtail complex, 25 to 60 percent slopes, stony

Setting

Landform:

- Martab—Escarpments
- Bangtail—Escarpments

Slope:

- Martab—25 to 60 percent
- Bangtail—25 to 60 percent

Elevation: 5,150 to 6,000 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Martab and similar soils: 65 percent
 Bangtail and similar soils: 25 percent

Minor Components

Bridger loam, moist: 0 to 5 percent
 Rocko stony loam: 0 to 5 percent

Major Component Description

Martab

Surface layer texture: Gravelly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 9.2 inches

Bangtail

Surface layer texture: Gravelly loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, clayey sedimentary beds
Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Martinsdale Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Alluvial fans, hills, relict stream terraces, and escarpments

Parent material: Alluvium or colluvium

Slope range: 0 to 35 percent

Elevation range: 4,350 to 6,500 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Martinsdale cobbly loam, 8 to 15 percent slopes, in an area of rangeland, 1,300 feet north and 2,000 feet east of the southwest corner of sec. 12, T. 2 S., R. 2 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; common fine tubular pores; 10 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bt—5 to 13 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate fine angular blocky; very hard, very firm, moderately sticky, and moderately plastic; many very fine and fine roots; 5 percent pebbles; common distinct clay films on faces of peds; neutral; gradual wavy boundary.

Bk1—13 to 26 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, moderately sticky, and moderately plastic; common very fine and fine roots; few fine tubular pores; 5 percent cobbles and 10 percent pebbles;

common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—26 to 60 inches; light gray (10YR 7/2) gravelly sandy loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; few very fine roots; 10 percent cobbles and 20 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 13 inches

Depth to the Bk horizon: 12 to 25 inches

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 15 to 32 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2, 3, or 4

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy loam, or silt loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

352C—Martinsdale clay loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans

Slope: 4 to 8 percent

Elevation: 4,650 to 5,450 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Martinsdale and similar soils: 85 percent

Minor Components

Meagher cobbly loam: 0 to 6 percent
 Soils with slopes more than 8 percent: 0 to 6 percent
 Beanlake loam: 0 to 3 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

252D—Martinsdale cobbly loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 8 to 15 percent
Elevation: 4,550 to 5,850 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Martinsdale and similar soils: 85 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent
 Meagher cobbly loam: 0 to 5 percent
 Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 7.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

52B—Martinsdale loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 0 to 4 percent
Elevation: 4,400 to 5,950 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Martinsdale and similar soils: 85 percent

Minor Components

Martinsdale cobbly loam: 0 to 5 percent
 Meagher cobbly loam: 0 to 5 percent
 Beanlake loam: 0 to 3 percent
 Soils with slopes more than 4 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

52E—Martinsdale loam, 15 to 35 percent slopes

Setting

Landform: Escarpments
Slope: 15 to 35 percent

Elevation: 4,350 to 6,050 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Martinsdale and similar soils: 85 percent

Minor Components

Bowery loam: 0 to 5 percent
 Meagher cobbly loam: 0 to 5 percent
 Soils with slopes more than 35 percent: 0 to 3 percent
 Beanlake gravelly loam: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

52C—Martinsdale loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 4 to 8 percent
Elevation: 4,550 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Martinsdale and similar soils: 85 percent

Minor Components

Bowery loam: 0 to 5 percent
 Meagher cobbly loam: 0 to 5 percent
 Beanlake loam: 0 to 3 percent
 Work clay loam: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

52D—Martinsdale loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 8 to 15 percent
Elevation: 4,450 to 5,850 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Martinsdale and similar soils: 85 percent

Minor Components

Bowery loam: 0 to 5 percent
 Meagher cobbly loam: 0 to 5 percent
 Anceney cobbly loam: 0 to 3 percent
 Beanlake loam: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

852D—Martinsdale-Cabba complex, 8 to 15 percent slopes

Setting

Landform:

- Martinsdale—Hills
- Cabba—Hills

Slope:

- Martinsdale—8 to 15 percent
- Cabba—8 to 15 percent

Elevation: 4,700 to 5,600 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Martinsdale and similar soils: 70 percent

Cabba and similar soils: 20 percent

Minor Components

Brodyk silt loam: 0 to 5 percent

Reedwest loam: 0 to 5 percent

Major Component Description

Martinsdale

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.9 inches

Cabba

Surface layer texture: Silt loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 2.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

652E—Martinsdale-Shawmut complex, 15 to 35 percent slopes, very stony

Setting

Landform:

- Martinsdale—Relict stream terraces and alluvial fans
- Shawmut—Relict stream terraces and alluvial fans

Slope:

- Martinsdale—15 to 35 percent
- Shawmut—15 to 35 percent

Elevation: 4,600 to 6,500 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Martinsdale and similar soils: 60 percent

Shawmut and similar soils: 25 percent

Minor Components

Martinsdale bouldery loam: 0 to 8 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Martinsdale

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

Shawmut

Surface layer texture: Very cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

652D—Martinsdale-Shawmut complex, 8 to 15 percent slopes, very stony

Setting

Landform:

- Martinsdale—Relict stream terraces and alluvial fans
- Shawmut—Relict stream terraces and alluvial fans

Slope:

- Martinsdale—8 to 15 percent
- Shawmut—8 to 15 percent

Elevation: 4,500 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Martinsdale and similar soils: 60 percent

Shawmut and similar soils: 25 percent

Minor Components

Beanlake stony loam: 0 to 5 percent

Martinsdale bouldery loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Martinsdale

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.1 inches

Shawmut

Surface layer texture: Very cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Mccabe Series

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Permeability: Moderately rapid

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 3,950 to 4,400 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid, frigid Aeric Fluvaquents

Typical Pedon

Mccabe loam, in an area of Rivra-Mccabe-Bonebasin complex, 0 to 2 percent slopes, moist, occasional flooding, in an area of pasture, 1,800 feet north and 1,900 feet west of the southeast corner of sec. 22, T. 2 N., R. 2 E.

A—0 to 7 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and few medium and coarse; strongly effervescent; slightly alkaline; clear smooth boundary.

C—7 to 21 inches; dark grayish brown (10YR 4/2) sandy loam, grayish brown (10YR 5/2) dry; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; massive; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 5 percent cobbles and 5 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

2C—21 to 60 inches; variegated very cobbly loamy coarse sand; massive; loose, nonsticky, and

nonplastic; few very fine and fine roots; 25 percent cobbles and 30 percent pebbles; slightly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 43 to 46 degrees F

Moisture control section: Between 4 and 12 inches

Depth to seasonal high water table: 12 to 24 inches

Depth to the 2C horizon: 20 to 40 inches

A horizon

Value: 2, 3, 4, or 5 moist; 4, 5 or 6 dry

Chroma: 1 or 2

Clay content: 15 to 25 percent

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 5.1 to 7.8

C horizon

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 1, 2, or 3

Texture: Loam, sandy loam, fine sandy loam, or very fine sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 6.6 to 8.4

2C horizon

Hue: 10YR or variegated

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 1 or 2

Texture: Loamy sand, sand, or loamy coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 70 percent—15 to 25 percent cobbles; 25 to 45 percent pebbles

Calcium carbonate equivalent: 1 to 15 percent

Reaction: pH 6.6 to 7.8

Meadowcreek Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Moderate above the 2C horizon and very rapid in the 2C horizon

Landform: Stream terraces and flood plains

Parent material: Alluvium

Slope range: 0 to 4 percent

Elevation range: 4,000 to 5,950 feet

Annual precipitation: 10 to 18 inches

Annual air temperature: 39 to 45 degrees F

Frost-free period: 90 to 115 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Fluvaquent Haplustolls

Typical Pedon

Meadowcreek silty clay loam, in an area of Meadowcreek, slightly saline-Rivra complex, 0 to 2 percent slopes; 2,200 feet north and 3,200 feet west of the southeast corner of sec. 4, T. 1 N., R. 1 E.

Ap—0 to 6 inches; dark gray (10YR 4/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and few medium roots; strongly effervescent; slightly alkaline; clear smooth boundary.

A—6 to 11 inches; dark gray (10YR 4/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and few medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

Bg1—11 to 19 inches; light brownish gray (10YR 6/2) silt loam with thin strata of sandy loam and fine sandy loam, dark grayish brown (10YR 4/2) moist; few fine faint brown (7.5YR 5/4) redox concentrations; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bg2—19 to 25 inches; light brownish gray (10YR 6/2) sandy clay loam with thin strata of sandy loam, and fine sandy loam, dark grayish brown (10YR 4/2) moist; many fine distinct brown (7.5YR 5/4) redox concentrations; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

2C1—25 to 29 inches; grayish brown (10YR 5/2) very gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky, and nonplastic; few very fine roots; 10 percent cobbles and 35 percent pebbles; slightly alkaline; clear wavy boundary.

2C2—29 to 60 inches; grayish brown (10YR 5/2) very gravelly loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky, and

nonplastic; 10 percent cobbles and 40 percent pebbles; slightly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 15 inches

Depth to seasonal high water table: 24 to 42 inches

Depth to the 2C horizon: 20 to 40 inches

A horizons

Hue: 10YR or 2.5Y

Value: 2 or 3 moist; 4 or 5 dry

Chroma: 1 or 2

Texture: Loam or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 8

Reaction: pH 6.6 to 8.4

Bg horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 3 or 4 moist; 5 or 6 dry

Chroma: 1, 2, or 3

Texture: Loam, silt loam, sandy clay loam, or sandy loam

Clay content: 18 to 25 percent

Content of rock fragments: 0 to 5 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 6.6 to 8.4

2C horizons

Texture: Sand or loamy sand

Clay content: 0 to 5 percent

Content of rock fragments: 35 to 75 percent—0 to 10 percent cobbles; 35 to 65 percent pebbles

Reaction: pH 6.1 to 7.8

510B—Meadowcreek loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 4 percent

Elevation: 4,200 to 5,950 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Meadowcreek and similar soils: 85 percent

Minor Components

Blossberg loam: 0 to 10 percent

Beaverton loam moderately wet: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

504A—Meadowcreek silty clay loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,000 to 5,000 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Meadowcreek and similar soils: 85 percent

Minor Components

Bonebasin loam: 0 to 5 percent

Rivra sandy loam: 0 to 5 percent

Ryell sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

503A—Meadowcreek, slightly saline-Rivra complex, 0 to 2 percent slopes**Setting***Landform:*

- Meadowcreek—Flood plains
- Rivra—Flood plains

Slope:

- Meadowcreek—0 to 2 percent
- Rivra—0 to 2 percent

Elevation: 4,000 to 4,400 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Meadowcreek and similar soils: 55 percent

Rivra and similar soils: 30 percent

Minor Components

Bonebasin loam: 0 to 6 percent

Fairway loam: 0 to 5 percent

Ryell sandy loam: 0 to 4 percent

Major Component Description**Meadowcreek***Surface layer texture:* Silty clay loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Somewhat poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Salt affected:* Saline within 30 inches*Available water capacity:* Mainly 4.7 inches**Rivra***Surface layer texture:* Gravelly sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Available water capacity:* Mainly 2.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

513A—Meadowcreek-Bonebasin complex, 0 to 2 percent slopes**Setting***Landform:*

- Meadowcreek—Flood plains
- Bonebasin—Flood plains

Slope:

- Meadowcreek—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 4,000 to 5,250 feet*Mean annual precipitation:* 12 to 18 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Meadowcreek and similar soils: 60 percent

Bonebasin and similar soils: 25 percent

Minor Components

Fairway loam: 0 to 5 percent

Lamoose loam: 0 to 5 percent

Nesda loam: 0 to 5 percent

Major Component Description**Meadowcreek***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Somewhat poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Available water capacity:* Mainly 5.3 inches**Bonebasin***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Very poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

603A—Meadowcreek-Rivra complex, 0 to 2 percent slopes

Setting

Landform:

- Meadowcreek—Flood plains
- Rivra—Flood plains

Slope:

- Meadowcreek—0 to 2 percent
- Rivra—0 to 2 percent

Elevation: 4,000 to 4,600 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Meadowcreek and similar soils: 55 percent

Rivra and similar soils: 30 percent

Minor Components

Bonebasin loam: 0 to 5 percent

Fairway loam: 0 to 5 percent

Ryell sandy loam: 0 to 5 percent

Major Component Description

Meadowcreek

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 5.1 inches

Rivra

Surface layer texture: Gravelly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 2.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Meagher Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Alluvial fans, escarpments, and stream terraces

Parent material: Alluvium or colluvium

Slope range: 0 to 35 percent

Elevation range: 4,500 to 6,150 feet

Annual precipitation: 12 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Meagher loam, in an area of Anceney-Trimad-Meagher complex, 15 to 60 percent slopes, in an area of rangeland, 2,200 feet south and 1,900 feet west of the northeast corner of sec. 11, T. 2 S., R. 1 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2)

loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bt—6 to 19 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; common faint clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bk1—19 to 31 inches; very pale brown (10YR 7/3) loam, light yellowish brown (10YR 6/4) moist; weak medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine, fine, and medium roots; 5 percent cobbles and 5 percent pebbles; common fine masses of lime; violently effervescent, moderately alkaline; clear smooth boundary.

2Bk2—31 to 60 inches; light gray (10YR 7/2) very cobbly loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, moderately sticky, and moderately plastic; few very fine and fine roots; 30 percent cobbles and 30 percent pebbles; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 10 inches

Depth to the Bk horizon: 11 to 20 inches

Depth to loamy-skeletal material: 20 to 35 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Reaction: pH 6.6 to 7.8

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 7 or 8 dry; 5 or 6 moist

Chroma: 2, 3, or 4

Texture: Sandy loam or loam

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.4 to 8.4

2Bk2 horizon

Hue: 10YR or 2.5Y

Value: 7 or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Sandy loam, loam, or sandy clay loam

Clay content: 10 to 25 percent

Content of rock fragments: 35 to 70 percent—5 to 35 percent cobbles; 30 to 35 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

257B—Meagher cobbly loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 0 to 4 percent

Elevation: 5,550 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Meagher and similar soils: 90 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent

Martinsdale loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

257C—Meagher cobbly loam, 4 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 4 to 8 percent

Elevation: 5,500 to 5,950 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Meagher and similar soils: 90 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent

Martinsdale loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

57C—Meagher loam, 4 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 4 to 8 percent

Elevation: 4,500 to 5,700 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Meagher and similar soils: 85 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent

Martinsdale loam: 0 to 5 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

57D—Meagher loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 8 to 15 percent

Elevation: 4,750 to 5,200 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Meagher and similar soils: 90 percent

Minor Components

Anceney cobbly loam: 0 to 8 percent

Soils with slopes more than 15 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

752E—Meagher-Shawmut-Bowery complex, 15 to 45 percent slopes

Setting

Landform:

- Meagher—Escarpments
- Shawmut—Escarpments
- Bowery—Escarpments

Slope:

- Meagher—15 to 35 percent
- Shawmut—15 to 45 percent
- Bowery—15 to 35 percent

Elevation: 4,600 to 6,150 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Meagher and similar soils: 45 percent

Shawmut and similar soils: 35 percent

Bowery and similar soils: 10 percent

Minor Components

Shawmut stony loam: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Major Component Description

Meagher

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.4 inches

Shawmut

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.0 inches

Bowery

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Mooseflat Series

Depth class: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Permeability: Moderate above the 2Cg horizon and rapid in the 2Cg horizon
Landform: Flood plains and drainageways
Parent material: Alluvium
Slope range: 0 to 8 percent
Elevation range: 5,300 to 6,650 feet
Annual precipitation: 20 to 24 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive Typic Cryaquolls

Typical Pedon

Mooseflat silty clay loam, in an area of Beehive-Mooseflat complex, 0 to 4 percent slopes, occasional flooding, in an area of forest land, 2,400 feet north and 2,500 feet east of the southwest corner of sec. 36, T. 6 S., R. 3 E.

Oe—0 to 2 inches; very dark gray (10YR 3/1) mucky peat, dark gray (10YR 4/1) dry; neutral (pH 7.0); clear smooth boundary.

A—2 to 10 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; few fine faint yellowish brown (10YR 5/6) redox concentrations; moderate fine subangular blocky structure; hard, very friable, very sticky, and very plastic; many very fine, common fine, and few coarse roots; neutral; clear smooth boundary.

Bg1—10 to 16 inches; dark gray (10YR 4/1) silty clay loam, gray (10YR 5/1) dry; many medium distinct yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; hard, very friable, moderately sticky, and moderately plastic; many very fine, common fine, and few medium roots; slightly alkaline; clear wavy boundary.

Bg2—16 to 22 inches; very dark gray (10YR 3/1) silt loam, light brownish gray (10YR 6/2) dry; many medium distinct yellowish brown (10YR 5/6) redox concentrations; weak medium subangular blocky structure; soft, very friable, moderately sticky, and moderately plastic; common very fine and few fine and medium roots; slightly alkaline; clear wavy boundary.

2Cg—22 to 60 inches; variegated very gravelly loamy coarse sand; massive; loose, very friable, nonsticky, and nonplastic; few very fine and fine roots; 15 percent cobbles and 35 percent pebbles; slightly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 19 inches

Depth to seasonal high water table: Ponded to 12 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silty clay loam or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 10 percent cobbles and pebbles

Reaction: pH 5.6 to 7.3

Bg horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 2, 3, 4, or 5 moist

Chroma: 0, 1, or 2

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent cobbles and pebbles

Reaction: pH 6.1 to 7.8

2Cg horizon

Hue: 10YR, 2.5Y, or variegated

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 0, 1, or 2

Texture: Sand, loamy sand, coarse sand, or loamy coarse sand

Clay content: 2 to 12 percent

Content of rock fragments: 35 to 70 percent—15 to 50 percent stones and cobbles; 20 to 35 percent pebbles

Reaction: pH 5.6 to 7.8

Musselshell Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Relict stream terraces, hills, and escarpments

Parent material: Alluvium or limestone colluvium

Slope range: 0 to 35 percent

Elevation range: 4,100 to 5,500 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-loamy, carbonatic, frigid
Aridic Calcicustepts

Typical Pedon

Musselshell loam, in an area of Crago-Musselshell complex, 0 to 4 percent slopes, in an area of cropland, 600 feet south and 1,200 feet west of the northeast corner of sec. 19, T. 1 N., R. 2 E.

Ap1—0 to 4 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent pebbles;

strongly effervescent; slightly alkaline; clear smooth boundary.

Ap2—4 to 7 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—7 to 16 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 10 percent pebbles; disseminated lime, few fine threads of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—16 to 33 inches; white (10YR 8/2) gravelly loam, very pale brown (10YR 7/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; common very fine and few fine roots; 10 percent cobbles and 25 percent pebbles; common distinct lime coatings on rock fragments, few prominent lime casts on undersides of rock fragments; violently effervescent; moderately alkaline; clear wavy boundary.

2Ck—33 to 60 inches; white (10YR 8/2) very gravelly loam, very pale brown (10YR 7/3) moist; massive; hard, friable, slightly sticky, and slightly plastic; few very fine roots; 10 percent cobbles and 35 percent pebbles; common distinct lime coatings on rock fragments, few prominent lime casts on undersides of rock fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Depth to the Bk horizon: 4 to 8 inches

Ap horizons

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4
 Texture: Loam or sandy loam
 Clay content: 10 to 18 percent
 Content of rock fragments: 0 to 35 percent—0 to 10 percent cobbles; 0 to 25 percent pebbles
 Calcium carbonate equivalent: 40 to 60 percent
 Reaction: pH 7.9 to 8.4

2Ck horizon

Hue: 10YR or 2.5Y
 Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist
 Chroma: 2, 3, or 4
 Texture: Loam or sandy loam
 Clay content: 10 to 18 percent
 Content of rock fragments: 35 to 60 percent—10 to 20 percent cobbles; 25 to 40 percent pebbles
 Calcium carbonate equivalent: 40 to 60 percent
 Reaction: pH 7.9 to 8.4

225C—Musselshell cobbly loam, 2 to 8 percent slopes

Setting

Landform: Relict stream terraces
Slope: 2 to 8 percent
Elevation: 4,100 to 5,000 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Musselshell and similar soils: 85 percent

Minor Components

Crago very cobbly loam: 0 to 5 percent
 Musselshell very cobbly loam: 0 to 5 percent
 Soils with slopes more than 8 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

225D—Musselshell cobbly loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces
Slope: 8 to 15 percent
Elevation: 4,150 to 5,050 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Musselshell and similar soils: 85 percent

Minor Components

Crago very cobbly loam: 0 to 5 percent
 Musselshell very stony loam: 0 to 5 percent
 Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

25B—Musselshell loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Elevation: 4,100 to 5,250 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Musselshell and similar soils: 85 percent

Minor Components

Crago cobbly loam: 0 to 10 percent
 Soils with slopes more than 4 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

325E—Musselshell very cobbly loam, 15 to 35 percent slopes, very stony

Setting

Landform: Escarpments

Slope: 15 to 35 percent

Elevation: 4,300 to 4,950 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Musselshell and similar soils: 85 percent

Minor Components

Crago very stony loam: 0 to 5 percent

Musselshell bouldery loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Very cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

425E—Musselshell-Pensore, stony complex, 15 to 35 percent slopes

Setting

Landform:

- Musselshell—Hills

- Pensore—Hills

Slope:

- Musselshell—15 to 35 percent

- Pensore—15 to 35 percent

Elevation: 4,150 to 5,150 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Musselshell and similar soils: 50 percent

Pensore and similar soils: 35 percent

Minor Components

Crago stony loam: 0 to 8 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Musselshell

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.6 inches

Pensore

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Limestone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Nesda Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Rapid*Landform:* Stream terraces and flood plains*Parent material:* Alluvium*Slope range:* 0 to 6 percent*Elevation range:* 4,300 to 5,800 feet*Annual precipitation:* 15 to 22 inches*Annual air temperature:* 39 to 43 degrees F*Frost-free period:* 80 to 110 days**Taxonomic Class:** Sandy-skeletal, mixed, frigid
Fluventic Haplustolls**Typical Pedon**

Nesda loam, in an area of Sudworth-Nesda loams, 0 to 2 percent slopes, in an area of hayland, 2,500 feet north and 2,100 feet west of the southeast corner of sec. 14, T. 2 S., R. 4 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and common fine roots; 5 percent pebbles; neutral; clear smooth boundary.

AB—7 to 11 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and few fine roots; 10 percent pebbles; moderately alkaline; clear smooth boundary.

2C1—11 to 19 inches; brown (10YR 5/3) extremely gravelly loamy sand, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; many very fine roots; 15 percent cobbles and 55 percent pebbles; slightly alkaline; gradual smooth boundary.

2C2—19 to 60 inches; variegated extremely gravelly coarse sand; single grain; loose, nonsticky, and nonplastic; 20 percent cobbles and 45 percent pebbles; slightly alkaline.

Range in Characteristics*Soil temperature:* 41 to 45 degrees F*Moisture control section:* Between 12 and 35 inches*Mollic epipedon thickness:* 10 to 16 inches**Ap and AB horizons***Hue:* 10YR, 2.5Y, or 5Y*Value:* 3, 4, or 5 dry; 2 or 3 moist*Chroma:* 1, 2, or 3*Texture:* Loam or sandy loam*Clay content:* 10 to 20 percent*Content of rock fragments:* 5 to 30 percent—0 to

10 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 8.4**2C horizons***Hue:* 10YR, 2.5Y, or 5Y*Value:* 4, 5, 6, or 7 dry; 3, 4, or 5 moist*Chroma:* 1, 2, 3, or 4*Texture:* Loamy sand or sand*Clay content:* 0 to 10 percent*Content of rock fragments:* 35 to 80 percent—0 to

20 percent cobbles; 35 to 60 percent pebbles

Reaction: pH 7.4 to 7.8**207B—Nesda loam, 2 to 6 percent slopes****Setting***Landform:* Stream terraces*Slope:* 2 to 6 percent*Elevation:* 4,500 to 5,550 feet*Mean annual precipitation:* 18 to 22 inches*Frost-free period:* 80 to 95 days**Composition****Major Components**

Nesda and similar soils: 90 percent

Minor Components

Nesda very gravelly loam: 0 to 5 percent

Sudworth loam: 0 to 5 percent

Major Component Description*Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 3.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Newtman Series

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Permeability: Moderately slow

Landform: Stream terraces

Parent material: Mixed alluvium

Slope range: 0 to 4 percent

Elevation range: 4,100 to 5,200 feet

Annual precipitation: 12 to 19 inches

Annual air temperature: 37 to 41 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, calcareous, frigid Histic Humaquepts

Typical Pedon

Newtman mucky peat, in an area of Tetonview-Newtman complex, 0 to 2 percent slopes, in an area of pasture, 1,400 feet south and 1,900 feet west of the northeast corner of sec. 15, T. 1 N., R. 4 E.

Oe—0 to 9 inches; very dark gray (10YR 3/1) mucky peat, black (10YR 2/1) moist; few fine prominent strong brown (7.5YR 5/8) redox concentrations; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; strongly effervescent, moderately alkaline; clear smooth boundary.

A—9 to 15 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to moderate fine granular; very hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; slightly effervescent; slightly alkaline; clear wavy boundary.

Cg—15 to 28 inches; light gray (5Y 6/1) silty clay loam, gray (5Y 5/1) moist; massive; very hard, very firm, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent cobbles and 5 percent pebbles; slightly effervescent; moderately alkaline; clear wavy boundary.

2Cg—28 to 60 inches; light brownish gray (10YR 6/2) very gravelly sandy clay loam, dark gray (5Y 4/1) moist; massive; hard, firm, slightly sticky, and slightly plastic; 10 percent cobbles and 35 percent pebbles; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Histic epipedon thickness: 8 to 16 inches

Depth to seasonal high water table: Ponded to 12 inches

Depth to the 2C horizon: 28 to 38 inches

Oe horizon

Hue: 10YR or N

Value: 2 or 3 dry

Reaction: pH 7.4 to 8.4

A horizon

Hue: 10YR or N

Value: 3, 4, 5, or 6 dry; 2, 3 or 4 moist

Chroma: 0, 1, or 2

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.4 to 8.4

Cg horizon

Hue: 5Y, 2.5Y, 5BG, or N

Value: 4, 5, or 6 dry; 2, 3, 4, or 5 moist

Chroma: 0, 1, or 2

Texture: Silty clay loam, loam, or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.9 to 8.4

2Cg horizon

Hue: 10YR, 2.5Y, 5Y, or N

Value: 4, 5, or 6 dry; 2, 3, or 4 moist

Chroma: 0, 1, or 2

Texture: Sandy clay loam, sandy loam, clay loam, or loam

Clay content: 18 to 30 percent

Content of rock fragments: 25 to 60 percent—5 to 15 percent cobbles; 20 to 45 percent pebbles

Calcium carbonate equivalent: 2 to 10 percent

Reaction: pH 7.4 to 8.4

557A—Newtman mucky peat, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,100 to 4,950 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Newtman and similar soils: 90 percent

Minor Components

Organics more than 16 inches: 0 to 5 percent

Tetonview silt loam: 0 to 5 percent

Major Component Description

Surface layer texture: Mucky peat

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 6.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

558C—Newtman-Amsterdam complex, 2 to 8 percent slopes

Setting

Landform:

- Newtman—Stream terraces
- Amsterdam—Stream terraces

Slope:

- Newtman—2 to 4 percent
- Amsterdam—4 to 8 percent

Elevation: 4,950 to 5,200 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Newtman and similar soils: 50 percent

Amsterdam and similar soils: 35 percent

Minor Components

Tetonview silt loam: 0 to 10 percent

Beanlake gravelly loam: 0 to 5 percent

Major Component Description

Newtman

Surface layer texture: Mucky peat

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Forest land

Flooding: None

Water table: Apparent

Available water capacity: Mainly 6.2 inches

Amsterdam

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Norbert Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Very slow

Landform: Escarpments

Parent material: Interbedded sandstone and shale residuum

Slope range: 15 to 60 percent

Elevation range: 4,700 to 6,350 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 40 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Clayey, smectitic, calcareous, frigid, shallow Typic Ustorthents

Typical Pedon

Norbert silty clay, in an area of Norbert-Bacbuster complex, 15 to 60 percent slopes, in an area of rangeland, 900 feet south and 2,200 feet east of the northwest corner of section. 2, T. 4 N., R. 5 E.

A—0 to 3 inches; gray (10YR 6/1) silty clay, gray (10YR 5/1) moist; moderate fine granular

structure, very hard, very firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; slightly effervescent; slightly alkaline; clear smooth boundary.

Bky—3 to 13 inches; gray (10YR 6/1) silty clay, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; very hard, very firm, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; 5 percent channers; few fine masses of lime and gypsum; strongly effervescent; slightly alkaline; gradual wavy boundary.

Cr—13 to 60 inches; semiconsolidated shale; moderately alkaline.

Range in Characteristics

Soil temperature: 42 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Cr horizon: 10 to 20 inches

A horizon

Hue: 2.5Y or 5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 1 or 2

Clay content: 40 to 50 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 7.4 to 8.4

Bky horizon

Hue: 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 1 or 2

Clay content: 50 to 60 percent

Content of rock fragments: 0 to 10 percent pebbles

Gypsum: 1 to 3 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

715F—Norbert-Bacbuster complex, 15 to 60 percent slopes

Setting

Landform:

- Norbert—Escarpments
- Bacbuster—Escarpments

Slope:

- Norbert—15 to 60 percent
- Bacbuster—15 to 35 percent

Elevation: 4,700 to 6,350 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Norbert and similar soils: 60 percent

Bacbuster and similar soils: 30 percent

Minor Components

Castner channery loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Norbert

Surface layer texture: Silty clay

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

Bacbuster

Surface layer texture: Clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Nuley Series

Depth class: Deep

Drainage class: Well drained

Permeability: Moderate in the upper 24 inches and rapid below

Landform: Hills and bedrock-floored plains

Parent material: Gneiss and schist residuum

Slope range: 4 to 45 percent

Elevation range: 4,300 to 5,350 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Calcic Argiustolls

Typical Pedon

Nuley clay loam, 4 to 8 percent slopes, in an area of rangeland, 300 feet north and 200 feet east of the southwest corner of sec. 15, T. 1 S., R. 1 W.

Ap—0 to 6 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky, and slightly plastic; many fine and few coarse roots; neutral; abrupt smooth boundary.

Bt1—6 to 9 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium prismatic structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine and fine roots; common to many distinct clay films on faces of peds; neutral; clear wavy boundary.

Bt2—9 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; few distinct clay films on faces of peds; slightly alkaline; clear wavy boundary.

Bk—15 to 24 inches; light gray (10YR 7/2) loam, light brownish gray (10YR 6/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common fine roots; 5 percent pebbles; disseminated lime, few fine masses of lime; violently effervescent; moderately alkaline; abrupt smooth boundary.

2C—24 to 50 inches; olive gray (5Y 4/2) gravelly coarse sand, dark olive gray (5Y 3/2) moist; single grain; loose, nonsticky, and nonplastic; few fine roots; 25 percent pebbles; slightly effervescent; moderately alkaline; gradual irregular boundary.

R—50 inches; gneiss bedrock.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 10 inches

Depth to bedrock: 40 to 60 inches

Depth to the Bk horizon: 10 to 15 inches

Ap horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Texture: Clay loam or sandy loam

Clay content: 15 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 1, 2, 3, or 4

Texture: Loam or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 5 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 8.4

2C horizon

Hue: 7.5YR, 10YR, 2.5Y, or 5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Loamy coarse sand or coarse sand

Clay content: 0 to 5 percent

Content of rock fragments: 25 to 35 percent pebbles

Reaction: pH 7.4 to 8.4

45C—Nuley clay loam, 4 to 8 percent slopes

Setting

Landform: Bedrock-floored plains

Slope: 4 to 8 percent

Elevation: 4,550 to 5,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Nuley and similar soils: 85 percent

Minor Components

Nuley sandy loam: 0 to 5 percent

Rentsac gravelly sandy loam: 0 to 5 percent

Soils with slopes more than 8 percent: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Clay loam

Depth class: Deep (40 to 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

45D—Nuley clay loam, 8 to 15 percent slopes

Setting

Landform: Hills

Slope: 8 to 15 percent

Elevation: 4,550 to 5,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Nuley and similar soils: 85 percent

Minor Components

Nuley sandy loam: 0 to 5 percent

Rentsac gravelly sandy loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Clay loam

Depth class: Deep (40 to 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

745E—Nuley-Rentsac-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Nuley—Hills
- Rentsac—Hills
- Rock outcrop—Hills

Slope:

- Nuley—15 to 45 percent
- Rentsac—15 to 45 percent

Elevation: 4,300 to 5,350 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Nuley and similar soils: 50 percent

Rentsac and similar soils: 25 percent

Rock outcrop: 15 percent

Minor Components

Breton coarse sandy loam: 0 to 5 percent

Shurley flaggy sandy loam: 0 to 5 percent

Major Component Description

Nuley

Surface layer texture: Sandy loam

Depth class: Deep (40 to 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.5 inches

Rentsac

Surface layer texture: Gravelly sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.4 inches

Rock outcrop

Definition: Exposures of gneiss or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Nythar Series

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Permeability: Moderate

Landform: Flood plains and drainageways

Parent material: Alluvium

Slope range: 0 to 6 percent

Elevation range: 4,150 to 6,300 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Cumulic Endoaquolls

Typical Pedon

Nythar loam, in an area of Enbar-Nythar loams, 0 to 4 percent slopes, in an area of pasture, 1,900 feet south and 1,200 feet east of the northwest corner of sec. 19, T. 2 S., R. 6 E.

A—0 to 8 inches; black (10YR 2/1) loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine, common medium, and few coarse roots; slightly alkaline; clear smooth boundary.

Bg—8 to 33 inches; black (10YR 2/1) loam, dark grayish brown (10YR 4/2) dry; hard, very friable, moderately sticky, and moderately plastic; weak fine subangular blocky structure; common very fine and few fine and medium roots; neutral; clear wavy boundary.

Cg1—33 to 41 inches; black (10YR 2/1) stratified loam and sandy loam, dark grayish brown (10YR 4/2) dry; massive; hard, very friable, slightly sticky, and slightly plastic; common very fine and few fine roots; neutral; clear wavy boundary.

Cg2—41 to 60 inches; very dark gray (10YR 3/1) sandy loam with thin strata of loamy coarse sand, dark grayish brown (10YR 4/2) dry; massive; slightly hard, very friable, nonsticky, and nonplastic; few very fine roots; neutral.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 24 to 60 inches

Depth to seasonal high water table: Ponded to 12 inches

A horizon

Hue: 2.5Y or 10YR

Value: 2, 3, or 4 dry; 2 or 3 moist

Chroma: 0, 1, or 2

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bg horizon

Hue: 2.5Y, 10YR, or 5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 0, 1, or 2

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Reaction: pH 6.6 to 7.3

Cg horizons

Hue: 2.5Y or 10YR

Value: 4, 5, 6, or 7 dry; 2, 3, or 4 moist

Chroma: 1 or 2

Texture: Silty clay loam, loam, or sandy loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Reaction: pH 6.6 to 7.3

Ouselfal Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Mountains and hills

Parent material: Interbedded sandstone or shale residuum

Slope range: 8 to 60 percent

Elevation range: 6,100 to 8,800 feet

Annual precipitation: 25 to 30 inches

Annual air temperature: 32 to 37 degrees F

Frost-free period: 30 to 70 days

Taxonomic Class: Clayey-skeletal, smectitic Eutric Haplocryalfs

Typical Pedon

Ouselfal very channery sandy loam, in an area of Yellowmule-Ouselfal complex, 8 to 25 percent slopes, in an area of forest land, 2,200 feet north and 2,300 feet west of the southeast corner of sec. 4, T. 7 S., R. 3 E.

- Oi—0 to 2 inches; forest litter of slightly decomposed leaves, needles, and twigs.
- E1—2 to 7 inches; light brownish gray (10YR 6/2) very channery sandy loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine and few medium roots; common very fine and few fine and medium pores; 5 percent flagstones and 35 percent channers; strongly acid; clear smooth boundary.
- E2—7 to 19 inches; light gray (10YR 7/2) very channery sandy loam, brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and few medium roots; common very fine and few fine and medium pores; 10 percent flagstones and 35 percent channers; moderately acid; clear wavy boundary.
- Bt—19 to 25 inches; light gray (10YR 7/2) extremely gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and few medium roots; common very fine and few fine and medium pores; 20 percent cobbles and 45 percent pebbles; slightly acid; clear wavy boundary.
- Cr1—25 to 34 inches; semiconsolidated shale.
- Cr2—34 to 40 inches; semiconsolidated, fine-grained sandstone.
- R—40 inches; hard fine-grained sandstone.

Range in Characteristics

Soil temperature: 34 to 38 degrees.

Moisture control section: Between 4 and 12 inches

Depth to the R horizon: 20 to 40 inches

E1 horizon

Value: 5, 6, or 7 dry; 3, 4, or 5 moist
 Chroma: 2 or 3
 Clay content: 12 to 20 percent
 Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 5 to 15 percent flagstones; 20 to 45 percent channers
 Reaction: pH 5.1 to 6.0

E2 horizon

Value: 6 or 7 dry; 3, 4 or 5 moist
 Chroma: 1, 2, or 3
 Clay content: 12 to 20 percent
 Content of rock fragments: 35 to 60 percent—10 to 25 percent flagstones; 20 to 40 percent channers
 Reaction: pH 5.1 to 6.5

Bt horizon

Value: 5, 6, or 7 dry; 4 or 5 moist
 Chroma: 2, 3, or 4
 Texture: Clay loam or clay
 Clay content: 35 to 50 percent
 Content of rock fragments: 40 to 70 percent—10 to 25 percent cobbles or flagstones; 25 to 50 percent pebbles or channers
 Reaction: pH 5.1 to 6.5

496E—Ouselfal, very stony-Bridger-Redlodge complex, 4 to 45 percent slopes

Setting

Landform:

- Ouselfal—Hills
- Bridger—Drainageways
- Redlodge—Closed depressions

Slope:

- Ouselfal—15 to 45 percent
- Bridger—15 to 45 percent
- Redlodge—4 to 6 percent

Elevation: 6,100 to 7,650 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Ouselfal and similar soils: 50 percent
 Bridger and similar soils: 20 percent
 Redlodge and similar soils: 15 percent

Minor Components

Yellowmule loam: 0 to 10 percent
 Soils with a water table at 2.5 to 4 feet: 0 to 5 percent

Major Component Description

Ouselfal

Surface layer texture: Very flaggy sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.6 inches

Bridger

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.8 inches

Redlodge

Surface layer texture: Silty clay

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 10.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

592F—Ouselfal, very stony-Yellowmule complex, 35 to 60 percent slopes

Setting

Landform:

- Ouselfal—Mountains
- Yellowmule—Mountains

Slope:

- Ouselfal—35 to 60 percent
- Yellowmule—35 to 60 percent

Elevation: 7,800 to 8,800 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 30 to 55 days

Composition

Major Components

Ouselfal and similar soils: 50 percent

Yellowmule and similar soils: 35 percent

Minor Components

Cowood channery sandy loam: 0 to 10 percent

Rock outcrop: 0 to 5 percent

Major Component Description

Ouselfal

Surface layer texture: Very flaggy sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.6 inches

Yellowmule

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

492F—Ouselfal-Yellowmule complex, 35 to 60 percent slopes

Setting

Landform:

- Ouselfal—Mountains
- Yellowmule—Mountains

Slope:

- Ouselfal—35 to 60 percent
- Yellowmule—35 to 60 percent

Elevation: 6,400 to 8,000 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Ouselfal and similar soils: 50 percent

Yellowmule and similar soils: 35 percent

Minor Components

Cowood channery sandy loam: 0 to 10 percent

Rubble land: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Ouselfal

Surface layer texture: Very channery sandy loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 1.6 inches

Yellowmule

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Paddy Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderately slow
Landform: Mountains
Parent material: Residuum from hard shale and argillite
Slope range: 15 to 45 percent
Elevation range: 5,450 to 6,650 feet
Annual precipitation: 20 to 24 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Loamy, mixed, superactive Lithic Haplocryolls

Typical Pedon

Paddy clay loam, in an area of Uinta-Paddy complex, cool, 15 to 45 percent slopes, in an area of forest land, 200 feet north and 400 feet west of the southeast corner of sec. 14, T. 5 N., R. 4 E.

Oi—0 to 1 inch; slightly decomposed bark, grass, needles, roots, and twigs.

A—1 to 4 inches; dark reddish gray (5YR 4/2) clay loam, dark reddish brown (5YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; common very fine pores; 5 percent pebbles; neutral; abrupt smooth boundary.
 Bw1—4 to 10 inches; weak red (2.5YR 4/2) clay loam, dusky red (2.5YR 3/2) moist, moderate fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; common very fine and fine pores; 10 percent pebbles; slightly acid; clear smooth boundary.
 Bw2—10 to 16 inches; reddish brown (2.5YR 4/4) clay loam, dark reddish brown (2.5YR 3/4) moist; weak fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common fine and medium roots; common fine pores; 5 percent cobbles and 10 percent pebbles; moderately acid; clear smooth boundary.
 R—16 inches; thinly bedded hard red shale.

Range in Characteristics

Soil temperature: 36 to 40 degrees F
Moisture control section: Between 4 and 12 inches
Mollic epipedon thickness: 7 to 10 inches
Depth to the R horizon: 10 to 20 inches

A horizon

Hue: 5YR or 2.5YR
 Chroma: 2 or 3
 Clay content: 27 to 32 percent
 Content of rock fragments: 5 to 10 percent pebbles
 Reaction: pH 6.6 to 7.3

Bw1 horizon

Hue: 2.5YR or 5YR
 Value: 4 or 5 dry
 Chroma: 2 or 3
 Texture: Clay loam or loam
 Clay content: 25 to 35 percent
 Content of rock fragments: 5 to 15 percent—0 to 5 percent cobbles; 5 to 10 percent pebbles
 Reaction: pH 6.1 to 6.5

Bw2 horizon

Hue: 2.5YR or 5YR
 Value: 4 or 5 dry
 Chroma: 3 or 4
 Texture: Clay loam or loam
 Clay content: 25 to 35 percent
 Content of rock fragments: 10 to 20 percent—0 to 5 percent cobbles; 10 to 15 percent pebbles
 Reaction: pH 5.6 to 6.0

Patouza Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Slow*Landform:* Alluvial fans*Parent material:* Alluvium*Slope range:* 0 to 8 percent*Elevation range:* 4,050 to 5,300 feet*Annual precipitation:* 10 to 14 inches*Annual air temperature:* 41 to 45 degrees F*Frost-free period:* 95 to 115 days**Taxonomic Class:** Fine, smectitic, frigid Torricic
Argiustolls**Typical Pedon**

Patouza clay, 0 to 6 percent slopes, in an area of hayland, 2,000 feet north and 900 feet east of the southwest corner of sec. 11, T. 1 N., R. 1 E.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine and fine and common medium roots; neutral; clear wavy boundary.

Bt1—4 to 11 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; few slickensides; neutral; clear wavy boundary.

Bt2—11 to 16 inches; pale brown (10YR 6/3) clay, grayish brown (10YR 5/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; common distinct clay films on faces of peds and lining pores; few slickensides; slightly effervescent; moderately alkaline; clear wavy boundary.

Btk—16 to 24 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; few distinct clay films on faces of peds and lining pores; common

fine masses and seams of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk—24 to 60 inches; pale brown (10YR 6/3) stratified silty clay loam and fine sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; few fine masses and seams of lime; strongly effervescent; moderately alkaline.

Range in Characteristics*Soil temperature:* 43 to 47 degrees F*Moisture control section:* Between 4 and 12 inches*Mollic epipedon thickness:* 7 to 12 inches*Depth to the Bk horizon:* 21 to 30 inches**Ap horizon**

Hue: 10YR or 2.5Y

Value: 4 or 5 dry

Clay content: 40 to 50 percent

Content of rock fragments: 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay or silty clay

Clay content: 40 to 50 percent

Content of rock fragments: 0 to 10 percent pebbles

Reaction: pH 6.6 to 8.4

Btk horizon

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture: Clay loam or clay

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

Bk horizon

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture: Stratified sandy loam, fine sandy loam, sandy clay loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 9.0

23B—Patouza clay, 0 to 6 percent slopes**Setting***Landform:* Alluvial fans*Slope:* 0 to 6 percent*Elevation:* 4,050 to 5,100 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Patouza and similar soils: 90 percent

Minor Components

Varney sandy clay loam: 0 to 10 percent

Major Component Description*Surface layer texture:* Clay*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 9.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**723C—Patouza-Abor complex,
2 to 8 percent slopes****Setting***Landform:*

- Patouza—Alluvial fans
- Abor—Hills

Slope:

- Patouza—2 to 8 percent
- Abor—2 to 8 percent

Elevation: 4,150 to 5,300 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Patouza and similar soils: 60 percent

Abor and similar soils: 25 percent

Minor Components

Soils less than 20 inches to shale: 0 to 8 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Patouza***Surface layer texture:* Clay*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 9.4 inches**Abor***Surface layer texture:* Cobbly clay loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Semiconsolidated, clayey sedimentary beds*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Pensore Series*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Permeability:* Moderate*Landform:* Hills*Parent material:* Limestone residuum*Slope range:* 4 to 70 percent*Elevation range:* 3,950 to 5,750 feet*Annual precipitation:* 10 to 14 inches*Annual air temperature:* 41 to 45 degrees F*Frost-free period:* 95 to 115 days

Taxonomic Class: Loamy-skeletal, carbonatic, frigid
Lithic Calcustepts

Typical Pedon

Pensore gravelly loam, in an area of Crago-Pensore-Rock outcrop complex, 15 to 45 percent slopes, in an

area of rangeland, 1,320 feet north and 2,300 feet west of the southeast corner of sec. 1, T. 1 S., R. 1 W.

A—0 to 5 inches; grayish brown (10YR 5/2) gravelly loam, dark brown (10YR 4/3) moist; moderate very fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine roots; 10 percent angular cobbles and 20 percent angular pebbles; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—5 to 16 inches; very pale brown (10YR 7/3) very cobbly loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine roots; 30 percent angular cobbles and 30 percent angular pebbles; common faint lime coatings on coarse fragments; common prominent lime casts on undersides of coarse fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

R—16 inches; hard limestone bedrock with a few fractures.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to bedrock: 10 to 20 inches

Depth to the Bk horizon: 3 to 7 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 10 to 25 percent

Content of rock fragments: 15 to 60 percent—0 to 5 percent stones; 0 to 15 percent cobbles; 10 to 40 percent pebbles

Calcium carbonate equivalent: 5 to 45 percent

Reaction: pH 7.9 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 7 or 8 dry; 6 or 7 moist

Chroma: 2, 3, or 4

Clay content: 10 to 25 percent

Content of rock fragments: 35 to 60 percent—20 to 30 percent angular cobbles; 15 to 30 percent angular pebbles

Calcium carbonate equivalent: 40 to 60 percent including coarse fragments less than $\frac{3}{4}$ inch in size

Reaction: pH 7.9 to 8.4

716E—Pensore-Brocko-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Pensore—Hills
- Brocko—Hills
- Rock outcrop—Hills

Slope:

- Pensore—15 to 45 percent
- Brocko—15 to 35 percent

Elevation: 3,950 to 5,100 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Pensore and similar soils: 40 percent

Brocko and similar soils: 30 percent

Rock outcrop: 15 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 10 percent

Brocko stony loam: 0 to 5 percent

Major Component Description

Pensore

Surface layer texture: Gravelly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Limestone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.5 inches

Brocko

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.0 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

816E—Pensore-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Pensore—Hills
- Rock outcrop—Hills

Slope: 15 to 45 percent

Elevation: 4,000 to 5,750 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Pensore and similar soils: 60 percent

Rock outcrop: 30 percent

Minor Components

Crago stony loam: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Major Component Description

Pensore

Surface layer texture: Gravelly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Limestone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.5 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

816D—Pensore-Rock outcrop complex, 4 to 15 percent slopes

Setting

Landform:

- Pensore—Hills
- Rock outcrop—Hills

Slope: 4 to 15 percent

Elevation: 4,000 to 5,650 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Pensore and similar soils: 60 percent

Rock outcrop: 30 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 10 percent

Major Component Description

Pensore

Surface layer texture: Gravelly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Limestone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.5 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

816G—Pensore-Rock outcrop complex, 45 to 70 percent slopes

Setting

Landform:

- Pensore—Hills
- Rock outcrop—Hills

Slope: 45 to 70 percent

Elevation: 4,100 to 5,250 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Pensore and similar soils: 60 percent

Rock outcrop: 30 percent

Minor Components

Crago stony loam: 0 to 10 percent

Major Component Description

Pensore

Surface layer texture: Very gravelly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Limestone residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.3 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Philipsburg Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Landform: Hills and relict stream terraces
Parent material: Alluvium
Slope range: 4 to 25 percent
Elevation range: 5,000 to 7,350 feet
Annual precipitation: 20 to 24 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
 Ustic Argicryolls

Typical Pedon

Philipsburg loam, 8 to 25 percent slopes, in an area of rangeland, 700 feet north and 750 feet east of the southwest corner of sec. 30, T. 5 N., R. 6 E.

Oi—0 to 1 inch; slightly decomposed organic material.

A—1 to 7 inches; dark reddish brown (5YR 3/2) loam, dark reddish brown (5YR 2.5/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent pebbles; neutral; clear smooth boundary.

AB—7 to 15 inches; dark reddish brown (5YR 3/2) loam, dark reddish brown (5YR 2.5/2) moist; moderate medium subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent pebbles; neutral; clear smooth boundary.

Bt—15 to 28 inches; reddish brown (2.5YR 4/4) gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common prominent clay films on faces of peds; 5 percent cobbles and 15 percent pebbles; slightly alkaline; clear smooth boundary.

Bk—28 to 60 inches; reddish brown (2.5YR 4/4) gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, very friable, moderately sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 20 percent pebbles; few fine masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 15 inches

Depth to the Bk horizon: 20 to 30 inches

A horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 3, 4, or 5 dry; 2.5 or 3 moist

Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

AB horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 3, 4, or 5 dry; 2.5 or 3 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizon

Hue: 2.5YR, 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam or loam

Clay content: 25 to 35 percent

Content of rock fragments: 5 to 30 percent—0 to 10 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 2.5YR, 5YR, 7.5YR, or 10YR

Value: 4, 5, 6, or 7 dry; 3, 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Clay loam or loam

Clay content: 20 to 30 percent
 Content of rock fragments: 10 to 35 percent—5 to 15 percent cobbles; 5 to 25 percent pebbles
 Calcium carbonate equivalent: 15 to 20 percent
 Reaction: pH 7.9 to 8.4

82E—Philipsburg loam, 8 to 25 percent slopes

Setting

Landform: Hills
Slope: 8 to 25 percent
Elevation: 5,000 to 7,350 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Philipsburg and similar soils: 85 percent

Minor Components

Adel loam: 0 to 5 percent
 Libeg stony loam: 0 to 5 percent
 Soils with slopes more than 25 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

482C—Philipsburg-Libeg complex, 4 to 8 percent slopes

Setting

Landform:
 • Philipsburg—Relict stream terraces
 • Libeg—Relict stream terraces
Slope:
 • Philipsburg—4 to 8 percent
 • Libeg—4 to 8 percent
Elevation: 5,750 to 6,800 feet

Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Philipsburg and similar soils: 50 percent
 Libeg and similar soils: 35 percent

Minor Components

Adel loam: 0 to 5 percent
 Libeg very stony loam: 0 to 5 percent
 Soils with slopes more than 8 percent: 0 to 5 percent

Major Component Description

Philipsburg

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.9 inches

Libeg

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Poin Series

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Hills
Parent material: Gneiss and schist residuum
Slope range: 4 to 45 percent
Elevation range: 5,000 to 7,300 feet
Annual precipitation: 20 to 24 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Lithic Haplocryolls

Typical Pedon

Poin very cobbly coarse sandy loam, in an area of Barbarella-Poin, stony-Bavdark complex, 15 to 45 percent slopes, in an area of rangeland, 1,400 feet north and 1,500 feet east of the southwest corner of sec. 25, T. 3 S., R. 3 E.

A—0 to 7 inches; dark grayish brown (10YR 4/2) very cobbly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and common fine roots; common very fine and fine tubular pores; 25 percent angular cobbles and 15 percent pebbles; moderately acid; clear smooth boundary.

Bw—7 to 15 inches; brown (10YR 5/3) very cobbly coarse sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and few fine roots; common very fine and fine tubular pores; 30 percent angular cobbles and 30 percent pebbles; slightly acid; clear wavy boundary.

Cr—15 to 19 inches; brown (10YR 5/3) and yellowish brown (10YR 5/4) highly weathered gneiss bedrock; slightly acid.

R—19 inches; hard gneiss bedrock.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to bedrock: 10 to 20 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 15 to 30 percent pebbles

Reaction: pH 5.6 to 7.3

Bw horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Sandy loam or coarse sandy loam

Clay content: 5 to 18 percent

Content of rock fragments: 45 to 65 percent—25 to 35 percent cobbles; 20 to 30 percent pebbles

Reaction: pH 6.1 to 7.8

Quagle Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Relict stream terraces

Parent material: Loess

Slope range: 0 to 45 percent

Elevation range: 4,200 to 5,500 feet

Annual precipitation: 14 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Coarse-silty, mixed, superactive, frigid Typic Calciustolls

Typical Pedon

Quagle silt loam, in an area of Amsterdam-Quagle silt loams, 4 to 8 percent slopes, in an area of cropland, 800 feet south and 2,600 feet east of the northwest corner of sec. 31, T. 2 S., R. 3 E.

Ap—0 to 6 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bw—6 to 9 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—9 to 23 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; many medium masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—23 to 60 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; common fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 10 inches

Depth to the calcic horizon: 6 to 10 inches

Ap horizon

Value: 4 or 5 dry

Chroma: 2 or 3

Clay content: 18 to 25 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent
Reaction: pH 7.4 to 8.4

Bw horizon

Value: 3, 4, or 5 moist; 4, 5, or 6 dry
Chroma: 2 or 3
Clay content: 18 to 25 percent
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

Bk horizons

Value: 5 or 6 moist; 6 or 7 dry
Chroma: 2, 3, or 4
Clay content: 10 to 18 percent—4 to 10 percent
clay size carbonates
Content of rock fragments: 0 to 5 percent pebbles
Calcium carbonate equivalent: 15 to 35 percent
Reaction: pH 7.9 to 8.4

**51B—Quagle silt loam,
0 to 4 percent slopes**

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Elevation: 4,200 to 5,250 feet
Mean annual precipitation: 14 to 18 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Quagle and similar soils: 85 percent

Minor Components

Amsterdam silt loam: 0 to 5 percent
Brodyk silt loam: 0 to 5 percent
Trimad cobbly loam: 0 to 3 percent
Soils with slopes more than 4 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**451C—Quagle-Brodyk silt loams,
4 to 8 percent slopes**

Setting

Landform:

- Quagle—Relict stream terraces
- Brodyk—Relict stream terraces

Slope:

- Quagle—4 to 8 percent
- Brodyk—4 to 8 percent

Elevation: 4,350 to 5,150 feet

Mean annual precipitation: 14 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Quagle and similar soils: 70 percent
Brodyk and similar soils: 20 percent

Minor Components

Amsterdam silt loam: 0 to 8 percent
Anceney cobbly loam: 0 to 2 percent

Major Component Description

Quagle

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.6 inches

Brodyk

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Loess
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

451D—Quagle-Brodyk silt loams, 8 to 15 percent slopes

Setting

Landform:

- Quagle—Relict stream terraces
- Brodyk—Relict stream terraces

Slope:

- Quagle—8 to 15 percent
- Brodyk—8 to 15 percent

Elevation: 4,300 to 5,300 feet

Mean annual precipitation: 14 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Quagle and similar soils: 60 percent

Brodyk and similar soils: 30 percent

Minor Components

Amsterdam silt loam: 0 to 8 percent

Anceney cobbly loam: 0 to 2 percent

Major Component Description

Quagle

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.6 inches

Brodyk

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

451E—Quagle-Brodyk silt loams, 15 to 45 percent slopes

Setting

Landform:

- Quagle—Relict stream terraces
- Brodyk—Relict stream terraces

Slope:

- Quagle—15 to 45 percent
- Brodyk—15 to 45 percent

Elevation: 4,200 to 5,400 feet

Mean annual precipitation: 14 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Quagle and similar soils: 50 percent

Brodyk and similar soils: 40 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent

Beanlake gravelly loam: 0 to 5 percent

Major Component Description

Quagle

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.6 inches

Brodyk

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Loess

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 10.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Quigley Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Relict stream terraces, alluvial fans, hills, and escarpments
Parent material: Alluvium, colluvium, or limestone alluvium
Slope range: 1 to 60 percent
Elevation range: 4,300 to 6,250 feet
Annual precipitation: 15 to 19 inches
Annual air temperature: 39 to 43 degrees F
Frost-free period: 90 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Haplustolls

Typical Pedon

Quigley loam, 8 to 15 percent slopes, in an area of rangeland, 100 feet south and 600 feet west of the northeast corner of sec. 36, T. 3 N., R. 3 E.

- A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, nonsticky, and slightly plastic; many very fine and fine, common medium, and few coarse roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.
- Bw—5 to 15 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; common fine and few medium and coarse roots; 5 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.
- Bk1—15 to 28 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 10 percent pebbles; common distinct lime coatings on rock fragments; violently effervescent; moderately alkaline; gradual wavy boundary.
- Bk2—28 to 60 inches; very pale brown (10YR 7/3) gravelly loam; pale brown (10YR 6/3) moist; weak moderate subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 20 percent pebbles; common distinct lime coatings

on rock fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F
Moisture control section: Between 4 and 12 inches
Mollic epipedon thickness: 7 to 15 inches
Depth to the Bk horizon: 7 to 15 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist
 Chroma: 2 or 3
 Texture: Loam or silt loam
 Clay content: 18 to 27 percent
 Content of rock fragments: 0 to 25 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 0 to 15 percent pebbles
 Reaction: pH 6.6 to 7.3

Bw horizon

Value: 4 or 5 dry
 Chroma: 2 or 3
 Texture: Loam or clay loam
 Clay content: 18 to 33 percent
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent pebbles
 Reaction: pH 6.6 to 7.8

Bk1 horizon

Value: 5, 6, or 7 dry; 4 or 5 moist
 Chroma: 1, 2, or 3
 Texture: Loam or clay loam
 Clay content: 18 to 30 percent
 Content of rock fragments: 5 to 25 percent—0 to 10 percent cobbles; 5 to 15 percent pebbles
 Calcium carbonate equivalent: 15 to 40 percent
 Reaction: pH 7.9 to 8.4

Bk2 horizon

Value: 7 or 8 dry; 6 or 7 moist
 Chroma: 1, 2, or 3
 Texture: Loam or clay loam
 Clay content: 18 to 30 percent
 Content of rock fragments: 10 to 30 percent—5 to 10 percent cobbles; 10 to 20 percent pebbles
 Calcium carbonate equivalent: 15 to 40 percent
 Reaction: pH 7.9 to 8.4

71C—Quigley loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces
Slope: 4 to 8 percent
Elevation: 4,400 to 5,800 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Quigley and similar soils: 85 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent

Beanlake gravelly loam: 0 to 5 percent

Martinsdale loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

71D—Quigley loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces

Slope: 8 to 15 percent

Elevation: 4,550 to 5,750 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Quigley and similar soils: 85 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent

Beanlake gravelly loam: 0 to 5 percent

Martinsdale loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

452B—Quigley-Beanlake complex, 0 to 4 percent slopes

Setting

Landform:

- Quigley—Relict stream terraces and alluvial fans
- Beanlake—Relict stream terraces and alluvial fans

Slope:

- Quigley—1 to 4 percent
- Beanlake—0 to 4 percent

Elevation: 4,300 to 5,150 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Quigley and similar soils: 50 percent

Beanlake and similar soils: 40 percent

Minor Components

Martinsdale loam: 0 to 8 percent

Corbly cobbly sandy loam: 0 to 2 percent

Major Component Description

Quigley

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.0 inches

Beanlake

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

452E—Quigley-Beanlake loams, 15 to 45 percent slopes

Setting

Landform:

- Quigley—Escarpments
- Beanlake—Escarpments

Slope:

- Quigley—15 to 45 percent
- Beanlake—15 to 45 percent

Elevation: 4,400 to 5,700 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Quigley and similar soils: 50 percent

Beanlake and similar soils: 40 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent

Bowery loam: 0 to 5 percent

Major Component Description

Quigley

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.0 inches

Beanlake

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

452C—Quigley-Beanlake loams, 4 to 8 percent slopes

Setting

Landform:

- Quigley—Relict stream terraces and alluvial fans
- Beanlake—Relict stream terraces and alluvial fans

Slope:

- Quigley—4 to 8 percent
- Beanlake—4 to 8 percent

Elevation: 4,550 to 5,900 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Quigley and similar soils: 55 percent

Beanlake and similar soils: 35 percent

Minor Components

Meagher cobbly loam: 0 to 5 percent

Windham cobbly loam: 0 to 5 percent

Major Component Description

Quigley

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.0 inches

Beanlake

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

452D—Quigley-Beanlake loams, 8 to 15 percent slopes

Setting

Landform:

- Quigley—Relict stream terraces and alluvial fans
- Beanlake—Relict stream terraces and alluvial fans

Slope:

- Quigley—8 to 15 percent
- Beanlake—8 to 15 percent

Elevation: 4,500 to 5,600 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Quigley and similar soils: 70 percent

Beanlake and similar soils: 20 percent

Minor Components

Bowery loam: 0 to 5 percent

Windham cobbly loam: 0 to 5 percent

Major Component Description

Quigley

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.0 inches

Beanlake

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Raynesford Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Hills

Parent material: Limestone alluvium

Slope range: 8 to 25 percent

Elevation range: 5,200 to 7,400 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, carbonatic Calcic Haplocryolls

Typical Pedon

Raynesford loam, in an area of Raynesford, stony-Hanson, very stony complex, 8 to 25 percent slopes, in an area of rangeland, 2,400 feet south and 1,800 feet west of the northeast corner of sec. 7, T. 3 N., R. 4 E.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 5 percent limestone pebbles; neutral; clear smooth boundary.

A2—6 to 11 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 5 percent limestone pebbles; slightly alkaline; clear wavy boundary.

A3—11 to 15 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine and fine and few medium roots; 5 percent limestone pebbles; slightly alkaline; clear smooth boundary.

Bk—15 to 60 inches; light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent limestone cobbles and 20 percent limestone pebbles; disseminated lime, common distinct lime coatings on coarse fragments, common fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 12 to 16 inches

Depth to the Bk horizon: 8 to 20 inches

A1 horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent stones; 0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

A2 horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 7.4 to 7.8

A3 horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Loam or clay loam

Clay content: 18 to 30 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 7.4 to 7.8

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 7 or 8 dry; 5 or 6 moist

Chroma: 1, 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 10 percent cobbles; 5 to 25 percent pebbles

Calcium carbonate equivalent: 40 to 50 percent

Reaction: pH 7.9 to 8.4

681E—Raynesford, stony-Hanson, very stony complex, 8 to 25 percent slopes

Setting

Landform:

- Raynesford—Hills
- Hanson—Hills

Slope:

- Raynesford—8 to 25 percent
- Hanson—8 to 25 percent

Elevation: 5,200 to 7,400 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Raynesford and similar soils: 70 percent

Hanson and similar soils: 20 percent

Minor Components

Windham stony loam: 0 to 4 percent

Adel loam: 0 to 3 percent

Soils with slopes more than 25 percent: 0 to 3 percent

Major Component Description

Raynesford

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.9 inches

Hanson

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Redchief Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Slow*Landform:* Hills*Parent material:* Sandstone colluvium*Slope range:* 8 to 35 percent*Elevation range:* 5,650 to 7,250 feet*Annual precipitation:* 20 to 24 inches*Annual air temperature:* 34 to 38 degrees F*Frost-free period:* 50 to 70 days**Taxonomic Class:** Clayey-skeletal, smectitic Ustic Argicryolls**Typical Pedon**

Redchief cobbly loam, 15 to 35 percent slopes, stony, in an area of rangeland, 1,600 feet south and 1,600 feet east of the northwest corner of sec. 33, T. 5 N., R. 7 E.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) cobbly loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; many fine vesicular pores; 10 percent cobbles and 5 percent pebbles; moderately acid; clear smooth boundary.

A2—6 to 10 inches; brown (7.5YR 4/2) very cobbly loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; many fine vesicular pores; 25 percent cobbles and 10 percent pebbles; moderately acid; abrupt smooth boundary.

Bt1—10 to 19 inches; reddish brown (5YR 5/3) very cobbly clay loam, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common fine tubular pores; common distinct clay films on faces of peds; 20 percent cobbles and 20 percent pebbles; slightly acid; gradual smooth boundary.

Bt2—19 to 29 inches; reddish brown (5YR 5/3) very cobbly clay, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, very sticky, and very plastic; few fine and medium roots; common fine and medium tubular pores; common distinct clay films on faces

of ped; 5 percent stones, 25 percent cobbles, and 20 percent pebbles; slightly acid; gradual smooth boundary.

Bt3—29 to 43 inches; reddish brown (5YR 5/4) very cobbly clay, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, very sticky, and very plastic; few medium roots; common fine tubular pores; few distinct clay films on faces of peds; 5 percent stones, 25 percent cobbles, and 20 percent pebbles; neutral; clear smooth boundary.

Bt4—43 to 60 inches; weak red (2.5YR 5/2) very cobbly clay, weak red (2.5YR 4/2) moist; moderate medium and fine subangular blocky structure; hard, firm, very sticky, and very plastic; 5 percent stones, 25 percent cobbles, and 20 percent pebbles; neutral.

Range in Characteristics*Soil temperature:* 36 to 40 degrees F*Moisture control section:* Between 4 and 12 inches*Mollic epipedon thickness:* 7 to 10 inches**A horizons**

Hue: 10YR or 7.5YR

Value: 2, 3, or 4 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 20 to 27 percent

Content of rock fragments: 15 to 35 percent—0 to 3 percent stones; 10 to 25 percent cobbles; 5 to 10 percent pebbles

Reaction: pH 5.1 to 6.0

Bt1 and Bt2 horizons

Hue: 5YR, 7.5YR, or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3, 4, 6, or 8

Texture: Clay or clay loam

Clay content: 35 to 60 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 15 to 25 percent cobbles; 20 to 30 percent pebbles

Reaction: pH 5.1 to 6.5

Bt3 and Bt4 horizons

Hue: 5YR, 7.5YR, or 10YR

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 2, 3, 4, 6, or 8

Clay content: 40 to 60 percent

Content of rock fragments: 35 to 70 percent—0 to 5 percent stones; 15 to 25 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 5.1 to 7.3

284D—Redchief cobbly loam, 8 to 15 percent slopes, stony

Setting

Landform: Hills
Slope: 8 to 15 percent
Elevation: 5,800 to 7,200 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Redchief and similar soils: 90 percent

Minor Components

Copenhaver flaggy loam: 0 to 4 percent
 Soils with slopes more than 15 percent: 0 to 3 percent
 Bridger loam: 0 to 2 percent
 Rock outcrop: 0 to 1 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandstone colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

284E—Redchief cobbly loam, 15 to 35 percent slopes, stony

Setting

Landform: Hills
Slope: 15 to 35 percent
Elevation: 5,650 to 7,250 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Redchief and similar soils: 85 percent

Minor Components

Bridger loam: 0 to 5 percent
 Copenhaver flaggy loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 4 percent
 Rock outcrop: 0 to 1 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandstone colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Redlodge Series

Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Slow
Landform: Drainageways and closed depressions
Parent material: Alluvium
Slope range: 4 to 6 percent
Elevation range: 5,100 to 7,950 feet
Annual precipitation: 20 to 30 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Cumulic Cryaquolls

Typical Pedon

Redlodge silty clay loam, in an area of Bridger-Ouselfal, very stony-Redlodge complex, 4 to 15 percent slopes, in an area of forest land, 2,200 feet north and 1,200 feet west of the southeast corner of sec. 34, T. 6 S., R. 3 E.

Oa—0 to 7 inches; highly decomposed roots and organic matter; slightly acid; clear wavy boundary.
 A—7 to 22 inches; black (N 2.5/) silty clay, very dark gray (N 3/) dry; common fine distinct brown (7.5YR 4/4) redox concentrations; weak medium subangular blocky structure; very hard, very firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; 5 percent pebbles; slightly acid; clear wavy boundary.
 Bg1—22 to 31 inches; very dark grayish brown (2.5Y 3/2) silty clay, dark gray (N 4/) dry; moderate

medium subangular blocky structure; common fine distinct light olive brown (2.5Y 5/6) redox concentrations; moderate medium subangular blocky structure; extremely hard, extremely firm, very sticky, and very plastic; few very fine and fine roots; 5 percent pebbles; slightly acid; gradual wavy boundary.

Bg2—31 to 60 inches; dark grayish brown (2.5Y 4/2) silty clay loam, light brownish gray (2.5Y 6.2) dry; common fine distinct olive brown (2.5Y 4/4) redox concentrations; weak medium subangular blocky structure; very hard, firm, very sticky, and very plastic; few very fine and fine roots; 5 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 20 to 30 inches

Depth to seasonal high water table: 12 to 24 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 0, 1, or 2

Texture: Silty clay or silty clay loam

Clay content: 30 to 50 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.8

Bg horizons

Hue: 2.5Y, 5Y, or 5GY

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 0, 1, 2, or 3

Texture: Silty clay or silty clay loam

Clay content: 35 to 45 percent

Content of rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.1 to 7.8

Reedwest Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Hills and escarpments

Parent material: Interbedded sandstone and shale residuum or semiconsolidated, loamy sedimentary beds

Slope range: 4 to 60 percent

Elevation range: 4,500 to 6,600 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Reedwest loam, in an area of Cabba-Reedwest-Anceney complex, 15 to 45 percent slopes, in an area of rangeland, 300 feet south and 2,800 feet east of the northwest corner of sec. 32, T. 2 S., R. 4 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt1—5 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate coarse and medium subangular blocky structure; soft, friable, moderately sticky, and slightly plastic; many very fine and fine and common medium roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt2—9 to 21 inches; brown (10YR 4/3) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bk—21 to 26 inches; light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 5 percent cobbles and 5 percent pebbles; common fine masses of lime; strongly effervescent, slightly alkaline; gradual wavy boundary.

Cr—26 to 60 inches; weakly consolidated sandstone and siltstone.

Range in Characteristics

Soil temperature: 41 to 45 degrees.

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the Bk horizon: 11 to 30 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 2, 3, 4, or 5 moist
Chroma: 2, 3, or 4
Texture: Loam or clay loam
Clay content: 18 to 35 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR, 2.5Y, or 5Y
Value: 6, 7, or 8 dry; 4, 5, or 6 moist
Chroma: 2, 3, or 4
Texture: Loam, clay loam, or fine sandy loam
Clay content: 15 to 30 percent
Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.4 to 8.4

**447E—Reedwest-Adel-Castner complex,
15 to 45 percent slopes**

Setting

Landform:

- Reedwest—Hills
- Adel—Hills
- Castner—Hills

Slope:

- Reedwest—15 to 35 percent
- Adel—15 to 45 percent
- Castner—15 to 45 percent

Elevation: 4,700 to 6,500 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Reedwest and similar soils: 40 percent

Adel and similar soils: 30 percent

Castner and similar soils: 15 percent

Minor Components

Soils less than 10 inches deep to bedrock: 0 to 10 percent

Soils with slopes more than 45 percent: 0 to 4 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Reedwest

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.3 inches

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 10.8 inches

Castner

Surface layer texture: Very channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**689F—Reedwest-Cabba complex,
35 to 60 percent slopes**

Setting

Landform:

- Reedwest—Hills
- Cabba—Hills

Slope:

- Reedwest—35 to 60 percent
- Cabba—35 to 60 percent

Elevation: 4,500 to 6,450 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Reedwest and similar soils: 60 percent
Cabba and similar soils: 30 percent

Minor Components

Castner very stony loam: 0 to 8 percent
Rock outcrop: 0 to 2 percent

Major Component Description

Reedwest

Surface layer texture: Clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 4.1 inches

Cabba

Surface layer texture: Loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Interbedded sandstone and shale residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

947E—Reedwest-Cabba-Bowery complex, 15 to 45 percent slopes

Setting

Landform:

- Reedwest—Escarpments
- Cabba—Escarpments
- Bowery—Escarpments

Slope:

- Reedwest—15 to 35 percent
- Cabba—15 to 45 percent
- Bowery—15 to 45 percent

Elevation: 4,550 to 6,050 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Reedwest and similar soils: 40 percent
Cabba and similar soils: 35 percent
Bowery and similar soils: 15 percent

Minor Components

Anceney cobbly loam: 0 to 8 percent
Rock outcrop: 0 to 2 percent

Major Component Description

Reedwest

Surface layer texture: Loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.3 inches

Cabba

Surface layer texture: Cobbly clay loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, loamy sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 2.6 inches

Bowery

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 11.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

347F—Reedwest-Cabba-Castner complex, 25 to 60 percent slopes

Setting

Landform:

- Reedwest—Hills
- Cabba—Hills
- Castner—Hills

Slope:

- Reedwest—25 to 60 percent
- Cabba—25 to 60 percent
- Castner—25 to 60 percent

Elevation: 5,450 to 6,500 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 95 to 110 days

Composition

Major Components

Reedwest and similar soils: 40 percent

Cabba and similar soils: 30 percent

Castner and similar soils: 20 percent

Minor Components

Bacbuster cobbly clay loam: 0 to 5 percent

Rock outcrop: 0 to 5 percent

Major Component Description

Reedwest

Surface layer texture: Cobbly clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.9 inches

Cabba

Surface layer texture: Cobbly clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.6 inches

Castner

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Rentsac Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Hills and escarpments

Parent material: Gneiss or schist and argillite residuum

Slope range: 8 to 45 percent

Elevation range: 4,050 to 5,350 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Calciusteps

Typical Pedon

Rentsac channery sandy loam, in an area of Rentsac-Rock outcrop complex, 15 to 60 percent slopes, in an area of rangeland, 800 feet north and 2,600 feet west of the southeast corner of sec. 25, T. 3 N., R. 2 E.

A—0 to 4 inches; grayish brown (10YR 5/2) channery sandy loam, brown (10YR 4/3) moist; moderate fine granular structure; loose, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 5 percent flagstones and 25 percent sandstone channers; slightly effervescent; moderately alkaline; clear wavy boundary.

Bk—4 to 14 inches; pale brown (10YR 6/3) extremely channery sandy loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; 20 percent flagstones and 60 percent channers; few fine masses of lime; strongly effervescent; moderately alkaline; abrupt wavy boundary.

R—14 inches; hard platy sandstone.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 8 inches and the lithic contact

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y
 Value: 5 or 6 dry; 3 or 4 moist
 Chroma: 2, 3, or 4
 Texture: Sandy loam or loam
 Clay content: 7 to 18 percent
 Content of rock fragments: 15 to 60 percent—0 to 20 percent cobbles or flagstones; 15 to 40 percent pebbles or channers
 Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y
 Value: 6 or 7 dry; 4 or 5 moist
 Chroma: 2, 3, or 4
 Texture: Loam or sandy loam
 Clay content: 7 to 18 percent
 Content of rock fragments: 35 to 80 percent—10 to 20 percent cobbles or flagstones; 25 to 60 percent pebbles or channers
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 8.4

412E—Rentsac-Amesha complex, 8 to 25 percent slopes

Setting

Landform:

- Rentsac—Escarpments
- Amesha—Escarpments

Slope:

- Rentsac—8 to 25 percent
- Amesha—8 to 15 percent

Elevation: 4,150 to 5,350 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days

Composition

Major Components

Rentsac and similar soils: 50 percent

Amesha and similar soils: 40 percent

Minor Components

Musselshell very stony loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Rentsac*Surface layer texture:* Channery loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.4 inches**Amesha***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 8.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

712D—Rentsac-Rock outcrop complex, 8 to 15 percent slopes

Setting

Landform:

- Rentsac—Hills
- Rock outcrop—Hills

Slope: 8 to 15 percent*Elevation:* 4,150 to 4,900 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days

Composition

Major Components

Rentsac and similar soils: 65 percent

Rock outcrop: 20 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 10 percent

Amesha loam: 0 to 5 percent

Major Component Description

Rentsac*Surface layer texture:* Channery sandy loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.4 inches**Rock outcrop***Definition:* Exposures of argillite bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

712E—Rentsac-Rock outcrop complex, 15 to 60 percent slopes

Setting

Landform:

- Rentsac—Escarpments
- Rock outcrop—Escarpments

Slope: 15 to 45 percent

Elevation: 4,050 to 5,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Rentsac and similar soils: 65 percent

Rock outcrop: 20 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 10 percent

Amesha loam: 0 to 5 percent

Major Component Description

Rentsac

Surface layer texture: Channery sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.4 inches

Rock outcrop

Definition: Exposures of argillite, gneiss, or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Reycreek Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,050 to 4,350 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Natrustolls

Typical Pedon

Reycreek loam, in an area of Reycreek-Toston-Slickspots complex, 0 to 2 percent slopes, in an area of rangeland, 500 feet south and 1,700 feet west of the northeast corner of sec. 9, T. 1 S., R. 2 E.

A—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine, common fine and few medium roots; common fine and few medium pores; strongly effervescent; moderately alkaline; clear smooth boundary.

B_{tn}—6 to 20 inches; light brownish gray (10YR 6/2) silty clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, very sticky, and very plastic; common very fine and fine and few medium roots; many very fine, common fine and few medium pores; common faint clay films on faces of peds and lining pores; strongly effervescent; very strongly alkaline; clear smooth boundary.

B_{kn}—20 to 36 inches; light brownish gray (10YR 6/2) silty clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; many very fine and few medium roots; common fine and few medium pores; common fine masses of lime; violently effervescent; strongly alkaline; clear wavy boundary.

B_{kg}—36 to 60 inches; gray (10YR 6/1) silty clay loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; hard, firm, very sticky, and very plastic; few very fine roots; few very fine and medium pores; violently effervescent; common medium masses of lime; strongly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 9 inches

Depth to seasonal high water table: 24 to 42 inches

Depth to the Bk horizon: 15 to 30 inches

A horizon

Chroma: 1 or 2

Clay content: 20 to 27 percent

Electrical conductivity (mmhos/cm): 0 to 4

Calcium carbonate equivalent: 5 to 25 percent

Reaction: pH 7.9 to 8.4

Btn horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Silty clay loam or clay loam

Clay content: 27 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 5 to 25 percent

Reaction: pH 8.5 to 9.6

Bkn horizon

Value: 6 or 7 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Texture: Silty clay loam, clay loam, silt loam, or loam

Clay content: 20 to 35 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 5 to 25

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 8.5 to 9.6

Bkg horizon

Value: 6 or 7 dry; 3, 4, or 5 moist

Chroma: 1 or 2

Texture: Silty clay loam, clay loam, silt loam, loam, or sandy loam

Clay content: 18 to 35 percent

Electrical conductivity (mmhos/cm): 0 to 4

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 8.5 to 9.0

518A—Reycreek loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,050 to 4,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Reycreek and similar soils: 90 percent

Minor Components

Threeriv loam: 0 to 5 percent

Greycliff loam: 0 to 3 percent

Slickspots: 0 to 2 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

521A—Reycreek-Toston-Slickspots complex, 0 to 2 percent slopes

Setting

Landform:

- Reycreek—Stream terraces
- Toston—Stream terraces

Slope:

- Reycreek—0 to 2 percent
- Toston—0 to 2 percent

Elevation: 4,050 to 4,350 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Reycreek and similar soils: 45 percent

Toston and similar soils: 30 percent

Slickspots: 10 percent

Minor Components

Greycliff loam: 0 to 5 percent

Rivra gravelly sandy loam: 0 to 5 percent

Threeriv loam: 0 to 5 percent

Major Component Description

Reycreek

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.8 inches

Toston

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 7.5 inches

Slickspots

Definition: A small area of loamy or clayey soil with a crusted surface, an excess of sodium, and supporting little or no vegetation.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Rivra Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Very rapid
Landform: Stream terraces and flood plains
Parent material: Alluvium
Slope range: 0 to 6 percent
Elevation range: 3,950 to 4,900 feet
Annual precipitation: 10 to 14 inches
Annual air temperature: 41 to 45 degrees F
Frost-free period: 95 to 120 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Aridic Ustifluvents

Typical Pedon

Rivra cobbly sandy loam, in an area of Fairway-Rivra complex, 0 to 2 percent slopes, in an area of rangeland, 1,200 feet south and 1,300 feet west of the northeast corner of sec. 9, T. 1 N., R. 1 E.

A—0 to 7 inches; dark gray (10YR 4/1) cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; 15 percent cobbles and 20 percent pebbles; slightly effervescent; moderately alkaline; clear wavy boundary.

C—7 to 60 inches; brown (10YR 5/3) extremely gravelly coarse sand, light olive brown (2.5Y 5/4) moist; massive; loose, nonsticky, and nonplastic; few very fine roots; 10 percent cobbles and 50 percent pebbles; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 12 and 35 inches

Depth to seasonal high water table: 0 to 6 feet for short durations during the months of April, May, June, and July.

A horizon

Hue: 10YR or 2.5Y

Value: 4, 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Texture: Clay loam, loam, or sandy loam

Clay content: 5 to 35 percent

Content of rock fragments: 0 to 40 percent—0 to 15 percent cobbles; 0 to 25 percent pebbles

Reaction: pH 6.6 to 8.4

C horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Sand, coarse sand, or loamy coarse sand

Clay content: 0 to 5 percent

Content of rock fragments: 55 to 80 percent—10 to 20 percent cobbles; 45 to 60 percent pebbles

Reaction: pH 7.4 to 8.4

201A—Rivra cobbly sandy loam, 2 to 6 percent slopes

Setting

Landform: Flood plains

Slope: 2 to 6 percent

Elevation: 4,250 to 4,750 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Rivra and similar soils: 85 percent

Minor Components

Glendive sandy loam: 0 to 5 percent

Rivra very cobbly sandy loam: 0 to 5 percent

Ryell sandy loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Available water capacity: Mainly 2.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**401A—Rivra, moist-Ryell-Bonebasin,
0 to 2 percent slopes****Setting**

Landform:

- Rivra—Flood plains
- Ryell—Flood plains
- Bonebasin—Flood plains

Slope:

- Rivra—0 to 2 percent
- Ryell—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 4,000 to 4,600 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition**Major Components**

Rivra and similar soils: 50 percent

Ryell and similar soils: 30 percent

Bonebasin and similar soils: 10 percent

Minor Components

Blossberg loam: 0 to 5 percent

Meadowcreek loam: 0 to 5 percent

Major Component Description**Rivra**

Surface layer texture: Sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Forest land

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 2.7 inches

Ryell

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 5.5 inches

Bonebasin

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**801A—Rivra-Emyd-Greycliff complex,
0 to 2 percent slopes, protected****Setting**

Landform:

- Rivra—Flood plains
- Emyd—Flood plains
- Greycliff—Flood plains

Slope:

- Rivra—0 to 2 percent
- Emyd—0 to 2 percent
- Greycliff—0 to 2 percent

Elevation: 3,950 to 4,200 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 120 days

Composition

Major Components

Rivra and similar soils: 40 percent
 Emyd and similar soils: 30 percent
 Greycliff and similar soils: 20 percent

Minor Components

Fairway loam: 0 to 5 percent
 Threeriv loam: 0 to 3 percent
 Slickspots: 0 to 2 percent

Major Component Description

Rivra

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Available water capacity: Mainly 2.7 inches

Emyd

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.0 inches

Greycliff

Surface layer texture: Silt loam
Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Water table: Apparent
Sodium affected: Sodic within 30 inches
Available water capacity: Mainly 5.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

701A—Rivra-Mccabe-Bonebasin complex, 0 to 2 percent slopes

Setting

Landform:

- Rivra—Flood plains
- Mccabe—Flood plains
- Bonebasin—Flood plains

Slope:

- Rivra—0 to 2 percent
- Mccabe—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 3,950 to 4,400 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Rivra and similar soils: 45 percent
 Mccabe and similar soils: 30 percent
 Bonebasin and similar soils: 10 percent

Minor Components

Rivra cobbly loam: 0 to 5 percent
 Threeriv loam: 0 to 5 percent
 Water: 0 to 3 percent
 Riverwash: 0 to 2 percent

Major Component Description

Rivra

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: Occasional
Water table: Apparent
Available water capacity: Mainly 2.4 inches

Mccabe

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: Occasional
Water table: Apparent
Available water capacity: Mainly 4.5 inches

Bonebasin*Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Very poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Occasional*Water table:* Apparent*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**301A—Rivra-Ryell-Bonebasin complex,
0 to 2 percent slopes****Setting***Landform:*

- Rivra—Flood plains
- Ryell—Flood plains
- Bonebasin—Flood plains

Slope:

- Rivra—0 to 2 percent
- Ryell—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 3,950 to 4,400 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Rivra and similar soils: 50 percent

Ryell and similar soils: 30 percent

Bonebasin and similar soils: 10 percent

Minor Components

Meadowcreek loam: 0 to 5 percent

Riverwash: 0 to 5 percent

Major Component Description**Rivra***Surface layer texture:* Sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Available water capacity:* Mainly 2.7 inches**Ryell***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Available water capacity:* Mainly 5.5 inches**Bonebasin***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Very poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Available water capacity:* Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Rochester Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Excessively drained*Permeability:* Rapid*Landform:* Hills*Parent material:* Gneiss or schist colluvium*Slope range:* 35 to 70 percent*Elevation range:* 4,900 to 6,600 feet*Annual precipitation:* 15 to 19 inches*Annual air temperature:* 39 to 43 degrees F*Frost-free period:* 90 to 110 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Ustorthents

Typical Pedon

Rochester very gravelly coarse sandy loam, in an area of Rochester, very stony-Rock outcrop complex, 35 to 70 percent slopes, in an area of forest land, 1,320 feet south and 800 feet east of the northwest corner of sec. 8, T. 4 S., R. 3 E.

A—0 to 4 inches; dark grayish brown (10YR 4/2) very gravelly coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular structure; loose, very friable, nonsticky, and nonplastic; common very fine and fine and few medium roots; 15 percent cobbles and 40 percent pebbles; neutral; clear wavy boundary.

C1—4 to 11 inches; grayish brown (10YR 5/2) extremely cobbly loamy coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 25 percent cobbles and 40 percent pebbles; neutral; clear wavy boundary.

C2—11 to 27 inches; brown (10YR 5/3) extremely cobbly loamy coarse sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 35 percent cobbles and 40 percent pebbles; neutral; clear wavy boundary.

C3—27 to 60 inches; brown (10YR 5/3) extremely cobbly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky, and nonplastic; few fine, medium, and coarse roots; 5 percent stones, 35 percent cobbles, and 30 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 40 to 47 degrees F

Moisture control section: Between 12 and 35 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 65 percent—1 to 5 percent stones; 15 to 20 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.6 to 7.3

C horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 1, 2, or 3

Texture: Loamy coarse sand, loamy sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 75 percent—5 to 10 percent stones; 15 to 35 percent cobbles; 15 to 40 percent pebbles

Reaction: pH 6.6 to 7.3

387G—Rochester, very stony-Rock outcrop complex, 35 to 70 percent slopes

Setting

Landform:

- Rochester—Hills
- Rock outcrop—Hills

Slope: 35 to 70 percent

Elevation: 4,900 to 6,600 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Rochester and similar soils: 80 percent

Rock outcrop: 10 percent

Minor Components

Catgull and similar soils: 0 to 5 percent

Rochester bouldery sandy loam: 0 to 5 percent

Major Component Description

Rochester

Surface layer texture: Very gravelly coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Excessively drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.7 inches

Rock outcrop

Definition: Exposures of gneiss or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Rocko Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Mountains

Parent material: Sandstone colluvium

Slope range: 15 to 60 percent

Elevation range: 4,800 to 7,000 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustollic Haplocryalfs

Typical Pedon

Rocko cobbly loam, 15 to 45 percent slopes, stony, in an area of forest land, 300 feet north and 2,500 feet east of the southwest corner of sec. 30, T. 5 N., R. 6 E.

Oi—0 to 1 inch; slightly decomposed needles and twigs.

A—1 to 6 inches; very dark grayish brown (10YR 3/2) cobbly loam, black (10YR 2/1) moist; moderate medium granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent stones, 15 percent cobbles, and 5 percent pebbles; neutral; clear wavy boundary.

E—6 to 16 inches; light brownish gray (10YR 6/2) stony loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent stones, 15 percent cobbles, and 5 percent pebbles; neutral; clear wavy boundary.

Bt—16 to 29 inches; brown (10YR 5/3) very cobbly clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 5 percent stones, 20 percent cobbles, and 20 percent pebbles; neutral; clear wavy boundary.

BC—29 to 60 inches; pale brown (10YR 6/3) very cobbly loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent stones, 20 percent cobbles, and 20 percent pebbles; slightly alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

A horizon

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 35 percent—5 to 10 percent stones; 5 to 15 percent cobbles; 5 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

E horizon

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 40 percent—5 to 10 percent stones; 5 to 15 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

Bt horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay loam or sandy clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 35 to 60 percent—5 to 10 percent stones; 15 to 25 percent cobbles; 15 to 30 percent pebbles

Reaction: pH 6.1 to 7.8

BC horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Sandy loam, sandy clay loam, or loam

Clay content: 18 to 27 percent

Content of rock fragments: 35 to 70 percent—5 to 10 percent stones; 15 to 30 percent cobbles; 15 to 30 percent pebbles

Reaction: pH 6.6 to 7.8

393E—Rocko cobbly loam, 15 to 45 percent slopes, stony

Setting

Landform: Mountains

Slope: 15 to 45 percent

Elevation: 4,800 to 7,000 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Rocko and similar soils: 85 percent

Minor Components

Rubble land: 0 to 10 percent

Copenhaver channery loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandstone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 5.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

894F—Rocko, stony-Copenhaver, extremely stony complex, 35 to 60 percent slopes

Setting

Landform:

- Rocko—Mountains
- Copenhaver—Mountains

Slope:

- Rocko—35 to 60 percent
- Copenhaver—35 to 60 percent

Elevation: 4,950 to 6,900 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Rocko and similar soils: 70 percent

Copenhaver and similar soils: 20 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Rocko

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandstone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 5.6 inches

Copenhaver

Surface layer texture: Extremely channery loam
Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Sandstone residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Roy Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Escarpments

Parent material: Alluvium

Slope range: 15 to 60 percent

Elevation range: 4,700 to 6,000 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Clayey-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Roy cobbly clay loam, 15 to 60 percent slopes, in an area of rangeland, 1,500 feet north and 300 feet east of the southwest corner of sec. 20, T. 3 S., R. 5 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) cobbly clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, firm, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 25 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

Bt1—6 to 13 inches; brown (10YR 4/3) very cobbly clay, dark brown (10YR 3/3) moist; strong fine granular structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds; 20 percent cobbles and 15 percent pebbles; neutral; clear wavy boundary.

Bt2—13 to 18 inches; brown (10YR 4/3) very cobbly clay, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; common distinct clay films

on faces of peds; 20 percent cobbles and 15 percent pebbles; neutral; clear wavy boundary.

Bt3—18 to 24 inches; brown (10YR 5/3) very cobbly clay, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of peds; 25 percent cobbles and 25 percent pebbles; neutral; gradual wavy boundary.

Bk—24 to 60 inches; pale brown (10YR 6/3) extremely cobbly clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, firm, moderately sticky, and moderately plastic; few very fine roots; 35 percent cobbles and 35 percent pebbles; common fine masses of lime; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 14 inches

Depth to the Bk horizon: 20 to 40 inches

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 15 to 35 percent—10 to 25 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

Bt1 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 80 percent—20 to 45 percent cobbles; 15 to 35 percent pebbles

Reaction: pH 6.6 to 7.3

Bt2 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Clay or clay loam

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 80 percent—20 to 45 percent cobbles; 15 to 35 percent pebbles

Reaction: pH 6.6 to 7.3

Bt3 horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 35 to 80 percent—20 to 45 percent cobbles; 15 to 35 percent pebbles

Reaction: pH 6.6 to 7.3

Bk horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Clay content: 27 to 40 percent

Content of rock fragments: 35 to 80 percent—20 to 45 percent cobbles; 15 to 35 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.4 to 8.4

267E—Roy cobbly clay loam, 15 to 60 percent slopes

Setting

Landform: Escarpments

Slope: 15 to 60 percent

Elevation: 4,750 to 6,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Roy and similar soils: 90 percent

Minor Components

Roy very stony loam: 0 to 5 percent

Meagher cobbly loam: 0 to 3 percent

Bowery loam: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

560—Rubble land-Rock outcrop complex

Setting

Landform:

- Rubble land—Mountains
- Rock outcrop—Mountains

Elevation: 4,100 to 9,000 feet

Composition

Major Components

Rubble land: 50 percent

Rock outcrop: 45 percent

Minor Components

Soils less than 20 inches deep: 0 to 5 percent

Major Component Description

Rubble land

Definition: Areas with more than 90 percent of the surface covered by boulders or stones.

Rock outcrop

Definition: Areas of exposed bedrock.

Ryell Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate above the 2C2 horizon and rapid in the 2C2 horizon

Landform: Stream terraces and flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 3,950 top 4,650 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid Aridic Ustifluvents

Typical Pedon

Ryell loam, in area of Ryell-Rivra-Fairway complex, 0 to 2 percent slopes, in an area of cropland, 500 feet north and 1,700 feet west of the southeast corner of sec. 26, T. 1 N., R. 1 W.

Ap—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; slightly

effervescent; moderately alkaline; abrupt wavy boundary.

AC—5 to 10 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1—10 to 32 inches; light brownish gray (10YR 6/2) stratified very fine sandy loam and silt loam, with thin strata of fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; strongly effervescent; moderately alkaline; gradual wavy boundary.

2C2—32 to 60 inches; variegated extremely gravelly loamy sand; loose, nonsticky, and nonplastic; 10 percent cobbles and 60 percent pebbles; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Depth to seasonal high water table: 0 to 6 feet for short durations during late spring and summer

Depth to the 2C2 horizon: 18 to 36 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Loam or fine sandy loam

Clay content: 10 to 25 percent

Reaction: pH 7.4 to 8.4

AC and C1 horizons

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy loam, or very fine sandy loam with thin strata of silt loam and/or fine sandy loam

Clay content: 10 to 18 percent

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

2C2 horizon

Hue: 10YR, 2.5Y, or variegated

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 75 percent—0 to 15 percent cobbles; 35 to 60 percent pebbles

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

4A—Ryell silt loam, 0 to 2 percent slopes**Setting***Landform:* Stream terraces*Slope:* 0 to 2 percent*Elevation:* 4,050 to 4,400 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Ryell and similar soils: 90 percent

Minor Components

Fairway loam: 0 to 5 percent

Glendive sandy loam: 0 to 5 percent

Major Component Description*Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Water table:* Apparent*Available water capacity:* Mainly 5.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

304A—Ryell-Rivra-Fairway complex, 0 to 2 percent slopes**Setting***Landform:*

- Ryell—Flood plains
- Rivra—Flood plains
- Fairway—Flood plains

Slope:

- Ryell—0 to 2 percent
- Rivra—0 to 2 percent
- Fairway—0 to 2 percent

Elevation: 3,950 to 4,650 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Ryell and similar soils: 35 percent

Rivra and similar soils: 30 percent

Fairway and similar soils: 25 percent

Minor Components

Bonebasin loam: 0 to 5 percent

Meadowcreek loam: 0 to 5 percent

Major Component Description**Ryell***Surface layer texture:* Fine sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Available water capacity:* Mainly 5.1 inches**Rivra***Surface layer texture:* Gravelly sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Available water capacity:* Mainly 2.3 inches**Fairway***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Somewhat poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* Rare*Water table:* Apparent*Salt affected:* Saline within 30 inches*Available water capacity:* Mainly 8.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

SLF—Sanitary landfill**Composition****Major Components**

Sanitary landfill: 100 percent

Major Component Description

Definition: Areas where refuse is processed and buried in the ground.

Sappington Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Alluvial fans and relict stream terraces

Parent material: Alluvium

Slope range: 4 to 15 percent

Elevation range: 4,600 to 5,500 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 43 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Coarse-loamy, mixed, superactive, frigid Calcic Argiustolls

Typical Pedon

Sappington loam, 4 to 8 percent slopes, in an area of cropland, 700 feet north and 2,300 feet east of the southwest corner of sec. 3, T. 2 N., R. 3 E.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine and few medium roots; neutral; clear smooth boundary.

Bt—4 to 7 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bk1—7 to 14 inches; light brownish gray (10YR 6/2) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—14 to 24 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—24 to 60 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak fine subangular

blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; few fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F

Moisture control section: Between 8 and 24 inches

Mollic epipedon thickness: 7 to 9 inches

Depth to the Bk horizon: 6 to 10 inches

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 25 percent—0 to 10 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

Bk1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2 or 3

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 25 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

Bk2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 5, 6, or 7 moist

Chroma: 2 or 3

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 25 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

Bk3 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 10 to 18 percent

Content of rock fragments: 0 to 25 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent
Reaction: pH 7.9 to 8.4

226D—Sappington cobbly loam, 4 to 15 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 4 to 15 percent
Elevation: 4,700 to 5,500 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Sappington and similar soils: 85 percent

Minor Components

Amesha loam: 0 to 5 percent
Soils with slopes more than 15 percent: 0 to 5 percent
Trimad very cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

26C—Sappington loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 4 to 8 percent
Elevation: 4,600 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Sappington and similar soils: 90 percent

Minor Components

Amesha loam: 0 to 5 percent
Sappington cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Sawicki Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well
Permeability: Moderately slow
Landform: Alluvial fans, stream terraces, hills, and drainageways
Parent material: Alluvium and colluvium derived from gneiss, schist, or arkosic sandstone
Slope range: 0 to 60 percent
Elevation range: 4,450 to 7,150 feet
Annual precipitation: 15 to 19 inches
Annual air temperature: 39 to 43 degrees F
Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Sawicki cobbly loam, 2 to 8 percent slopes, very stony, in an area of rangeland, 700 feet south and 2,800 feet west of the northeast corner of sec. 12, T. 1 N., R. 5 E.

A—0 to 5 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, slightly sticky, and slightly plastic; many very fine, common fine and few medium pores; many very fine and few medium roots; 5 percent stones, 25 percent cobbles, and 10 percent pebbles; neutral; gradual wavy boundary.
Bt1—5 to 12 inches; dark grayish brown (10YR 4/2) cobbly sandy clay loam, dark brown (10YR 3/3)

moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium and coarse roots; many very fine, common fine and few medium pores; few faint clay films on faces of peds and on pebbles; 5 percent stones, 10 percent cobbles, and 10 percent pebbles; neutral; gradual wavy boundary.

Bt2—12 to 23 inches; dark yellowish brown (10YR 4/4) very cobbly sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and fine roots; common very fine and fine and few medium pores; common distinct clay films on faces of peds and on pebbles; 5 percent stones, 25 percent cobbles, and 25 percent pebbles; slightly alkaline; gradual wavy boundary.

BC—23 to 31 inches; dark yellowish brown (10YR 4/4) very cobbly sandy clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common very fine and fine and few medium pores; 5 percent stones, 25 percent cobbles, and 25 percent pebbles; slightly alkaline; gradual wavy boundary.

C—31 to 60 inches; dark yellowish brown (10YR 4/4) very cobbly coarse sandy loam, brown (10YR 4/3) moist; massive; loose, nonsticky, and nonplastic; few very fine and fine roots; 5 percent stones, 25 percent cobbles, and 30 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or coarse sandy loam

Clay content: 12 to 20 percent

Content of rock fragments: 15 to 50 percent—0 to 5 percent boulders; 0 to 5 percent stones; 10 to 25 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.6 to 7.3

Bt1 horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Sandy clay loam or loam

Clay content: 20 to 30 percent

Content of rock fragments: 15 to 50 percent—0 to 5 percent stones; 10 to 25 percent cobbles; 5 to 20 percent pebbles

Reaction: pH 6.6 to 7.3

Bt2 horizon

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Loam or sandy clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 15 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

BC horizon

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Coarse sandy loam, sandy loam, or sandy clay loam

Clay content: 15 to 25 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 20 to 30 percent cobbles; 15 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

C horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 3 or 4

Clay content: 10 to 20 percent

Content of rock fragments: 35 to 70 percent—0 to 5 percent stones; 15 to 30 percent cobbles; 20 to 40 percent pebbles

Reaction: pH 6.1 to 7.3

261B—Sawicki cobbly loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 0 to 4 percent

Elevation: 4,450 to 5,650 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Sawicki and similar soils: 85 percent

Minor Components

Breton loam: 0 to 5 percent

Clasol loam: 0 to 5 percent

Sawicki very stony loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

361C—Sawicki cobbly loam, 2 to 8 percent slopes, very stony

Setting

Landform: Alluvial fans and stream terraces

Slope: 2 to 8 percent

Elevation: 4,500 to 5,850 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Sawicki and similar soils: 85 percent

Minor Components

Breton loam: 0 to 10 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

261C—Sawicki cobbly loam, 4 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 4 to 8 percent

Elevation: 4,600 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Sawicki and similar soils: 85 percent

Minor Components

Breton loam: 0 to 5 percent

Clasol loam: 0 to 5 percent

Sawicki very stony loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

361D—Sawicki cobbly loam, 8 to 15 percent slopes, very stony

Setting

Landform: Alluvial fans and stream terraces

Slope: 8 to 15 percent

Elevation: 4,700 to 6,150 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Sawicki and similar soils: 85 percent

Minor Components

Breton loam: 0 to 10 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

461D—Sawicki cobbly loam, 8 to 25 percent slopes, bouldery

Setting

Landform: Alluvial fans
Slope: 8 to 25 percent
Elevation: 5,000 to 6,050 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Sawicki and similar soils: 85 percent

Minor Components

Breton coarse sandy loam: 0 to 8 percent
 Clasoil cobbly sandy loam: 0 to 4 percent
 Soils with slopes more than 25 percent: 0 to 3 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

661E—Sawicki cobbly loam, moist, 8 to 25 percent slopes, very stony

Setting

Landform: Drainageways
Slope: 8 to 25 percent
Elevation: 4,900 to 6,250 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Sawicki and similar soils: 90 percent

Minor Components

Breton loam: 0 to 5 percent
 Soils with slopes more than 25 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

761E—Sawicki, stony-Catgulch, very stony complex, 15 to 35 percent slopes

Setting

Landform:

- Sawicki—Hills
- Catgulch—Hills

Slope:

- Sawicki—15 to 35 percent
- Catgulch—15 to 35 percent

Elevation: 5,500 to 7,150 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Sawicki and similar soils: 60 percent
 Catgulch and similar soils: 30 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 5 percent
 Soils with slopes more than 35 percent: 0 to 3 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Sawicki

Surface layer texture: Cobbly coarse sandy loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Gneiss or schist colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.7 inches

Catgulch

Surface layer texture: Very cobbly coarse sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Gneiss or schist residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

761F—Sawicki-Catgulch complex, 35 to 60 percent slopes, very stony

Setting

Landform:

- Sawicki—Hills
- Catgulch—Hills

Slope:

- Sawicki—35 to 60 percent
- Catgulch—35 to 60 percent

Elevation: 4,850 to 6,950 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Sawicki and similar soils: 65 percent
 Catgulch and similar soils: 20 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 8 percent
 Breton coarse sandy loam: 0 to 5 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Sawicki

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Gneiss or schist colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 3.7 inches

Catgulch

Surface layer texture: Very cobbly coarse sandy loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Gneiss or schist residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Saypo Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,050 to 5,250 feet

Annual precipitation: 10 to 18 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 90 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aquic Calciustolls

Typical Pedon

Saypo silt loam, 0 to 2 percent slopes, in an area of hayland, 200 feet north and 600 feet east of the southwest corner of sec. 9, T. 1 N., R. 4 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak medium subangular blocky structure parting to moderate

fine granular; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk—10 to 21 inches; grayish brown (10YR 5/2) silt loam, gray (10YR 6/1) dry; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bkg1—21 to 34 inches; gray (10YR 6/1) silt loam, grayish brown (2.5Y 5/2) dry; few fine distinct yellowish brown (10YR 5/4) redox concentrations; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine roots; common fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bkg2—34 to 60 inches; light brown (10YR 6/2) silt loam, white (10YR 8/1) dry; weak fine subangular blocky structure; very hard, very firm, moderately sticky, and slightly plastic; few very fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 12 inches

Depth to seasonal high water table: 24 to 42 inches

Depth to the Bk horizon: 5 to 12 inches

A horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist; 3, 4, or 5 dry

Chroma: 1 or 2

Clay content: 20 to 27 percent

Calcium carbonate equivalent: 5 to 15 percent

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 7.9 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 moist; 5, 6, or 7 dry

Chroma: 1, 2, or 3

Texture: Silt loam, clay loam, or silty clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 20 to 40 percent

Electrical conductivity (mmhos/cm): 2 to 8

Reaction: pH 7.9 to 8.4

Bkg horizons

Hue: 10YR, 5Y, or 2.5Y

Value: 4, 5, or 6 moist; 5, 6, 7, or 8 dry

Chroma: 1, 2, or 3

Texture: Silt loam, clay loam, silty clay loam, or loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 20 to 40 percent

Electrical conductivity (mmhos/cm): 0 to 4

Reaction: pH 7.9 to 8.4

506A—Saypo silt loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,050 to 5,100 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Saypo and similar soils: 85 percent

Minor Components

Newtman mucky peat: 0 to 5 percent

Reycreek loam: 0 to 5 percent

Tetonview silty clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Salt affected: Saline within 30 inches

Available water capacity: Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

517A—Saypo silt loam, 0 to 2 percent slopes, drained

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,200 to 4,600 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Saypo and similar soils: 85 percent

Minor Components

Saypo silty clay loam: 0 to 10 percent

Binna loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Salt affected: Saline within 30 inches

Available water capacity: Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

515A—Saypo-Tetonview complex, 0 to 2 percent slopes, hummocky

Setting

Landform:

- Saypo—Stream terraces
- Tetonview—Stream terraces

Slope:

- Saypo—0 to 2 percent
- Tetonview—0 to 2 percent

Elevation: 4,150 to 5,250 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Saypo and similar soils: 65 percent

Tetonview and similar soils: 25 percent

Minor Components

Newtman mucky peat: 0 to 5 percent

Reycreek loam: 0 to 5 percent

Major Component Description

Saypo

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Salt affected: Saline within 30 inches

Available water capacity: Mainly 7.4 inches

Tetonview

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 10.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Scravo Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately rapid above the sandy-skeletal material and rapid below

Landform: Escarpments

Parent material: Alluvium or colluvium

Slope range: 15 to 45 percent

Elevation range: 3,950 to 5,400 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Aridic Calciustepts

Typical Pedon

Scravo cobbly sandy loam, in an area of Blacksheep-Kalsted-Scravo complex, 15 to 45 percent slopes, in an area of rangeland, 500 feet south and 2,400 feet west of the northeast corner of sec. 13, T. 1 N., R. 3 E.

A—0 to 4 inches; grayish brown (10YR 5/2) cobbly sandy loam, dark grayish brown (10YR 4/2) moist;

weak, fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; 15 percent cobbles and 20 percent pebbles; slightly effervescent, slightly alkaline; clear smooth boundary.

Bk—4 to 13 inches; light brownish gray (10YR 6/2) very gravelly sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and nonplastic; common very fine and few fine and medium roots; 5 percent cobbles and 40 percent pebbles; common medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

2Bk—13 to 60 inches; variegated stratified sand and very gravelly loamy sand; single grain; loose, nonsticky, and nonplastic; few very fine and fine roots; 10 percent cobbles and 50 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 12 and 35 inches

Depth to the Bk horizon: 3 to 6 inches

Depth to the 2Bk horizon: 9 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 35 percent—10 to 15 percent cobbles; 5 to 20 percent pebbles

Calcium carbonate equivalent: 5 to 10 percent

Reaction: pH 7.4 to 7.8

Bk horizon

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 70 percent—0 to 15 percent cobbles; 35 to 55 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 2

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

2Bk horizon

Hue: 10YR, 2.5Y, or variegated

Value: 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Texture: Loamy sand or sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 80 percent—0 to

15 percent cobbles; 35 to 65 percent pebbles

Electrical conductivity (mmhos/cm): 0 to 2

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.9 to 8.4

Shadow Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Permeability: Moderately rapid

Landform: Mountains

Parent material: Gneiss or schist colluvium

Slope range: 15 to 75 percent

Elevation range: 5,000 to 7,800 feet

Annual precipitation: 20 to 30 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Eutrocrypts

Typical Pedon

Shadow very cobbly coarse sandy loam, moist, 35 to 60 percent slopes, stony, in an area of forest land, 300 feet north and 2,650 feet west of the southeast corner of sec. 7, T. 3 S., R. 6 E.

Oi—0 to 3 inches; slightly decomposed bark, needles, and twigs.

E—3 to 17 inches; brown (10YR 5/3) very cobbly coarse sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine, common fine and few medium roots; 20 percent cobbles and 30 percent pebbles; moderately acid; clear smooth boundary.

Bw—17 to 33 inches; light brownish gray (10YR 6/3) very gravelly coarse sandy loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and few fine and medium roots; 20 percent cobbles and 35 percent pebbles; slightly acid; clear smooth boundary.

C1—33 to 44 inches; pale brown (10YR 6/3) extremely gravelly coarse sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky, and nonplastic; few very fine, fine, and medium roots; 20 percent cobbles and 50 percent pebbles, slightly acid; clear smooth boundary.

C2—44 to 60 inches; light yellowish brown (10YR 6/4) extremely cobbly coarse sandy loam with thin strata of loamy coarse sand, dark brown (10YR 4/3) moist; massive; loose, very friable, nonsticky,

and nonplastic; few very fine roots; 35 percent cobbles and 45 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 8 and 24 inches

E horizon

Hue: 7.5YR or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Coarse sandy loam or sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 15 to 30 percent cobbles; 20 to 30 percent pebbles

Reaction: pH 5.1 to 7.3

Bw horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Sandy loam or coarse sandy loam

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 80 percent—0 to 20 percent cobbles; 35 to 70 percent pebbles

Reaction: pH 5.1 to 7.8

C horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Clay content: 5 to 15 percent

Content of rock fragments: 60 to 85 percent—0 to 35 percent cobbles; 40 to 50 percent pebbles

Reaction: pH 5.1 to 7.8

395F—Shadow very cobbly coarse sandy loam, 35 to 60 percent slopes, stony

Setting

Landform: Mountains

Slope: 35 to 60 percent

Elevation: 5,200 to 6,100 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Shadow and similar soils: 90 percent

Minor Components

Cowood channery sandy loam: 0 to 5 percent

Jaegie and similar soils: 0 to 4 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Surface layer texture: Very cobbly coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

295F—Shadow very cobbly coarse sandy loam, moist, 35 to 60 percent slopes, stony

Setting

Landform: Mountains

Slope: 35 to 60 percent

Elevation: 5,350 to 7,350 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Shadow and similar soils: 90 percent

Minor Components

Jaegie coarse sandy loam: 0 to 4 percent

Cowood channery sandy loam: 0 to 3 percent

Soils with slopes more than 60 percent: 0 to 2 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Surface layer texture: Very cobbly coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

995G—Shadow, bouldery-Rubble land complex, 40 to 70 percent slopes

Setting

Landform:

- Shadow—Mountains
- Rubble land—Mountains

Slope: 40 to 70 percent

Elevation: 6,100 to 7,300 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Shadow and similar soils: 60 percent

Rubble land: 25 percent

Minor Components

Arcette and similar soils: 0 to 10 percent

Rock outcrop: 0 to 5 percent

Major Component Description

Shadow

Surface layer texture: Very cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.7 inches

Rubble land

Definition: Areas with more than 90 percent of surface covered by boulders or stones.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

495F—Shadow, stony-Cowood, very stony complex, 35 to 60 percent slopes

Setting

Landform:

- Shadow—Mountains
- Cowood—Mountains

Slope:

- Shadow—35 to 60 percent
- Cowood—35 to 60 percent

Elevation: 5,650 to 7,800 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Shadow and similar soils: 70 percent

Cowood and similar soils: 20 percent

Minor Components

Jaegie and similar soils: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Shadow

Surface layer texture: Very cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat excessively drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.7 inches

Cowood

Surface layer texture: Channery sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

495G—Shadow, stony-Cowood, very stony complex, 60 to 75 percent slopes

Setting

Landform:

- Shadow—Mountains
- Cowood—Mountains

Slope:

- Shadow—60 to 75 percent
- Cowood—60 to 75 percent

Elevation: 5,000 to 6,800 feet*Mean annual precipitation:* 20 to 24 inches*Frost-free period:* 50 to 70 days**Composition****Major Components**

Shadow and similar soils: 70 percent

Cowood and similar soils: 20 percent

Minor Components

Jaegie and similar soils: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Shadow***Surface layer texture:* Very cobbly sandy loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Somewhat excessively drained*Dominant parent material:* Gneiss or schist colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 3.7 inches**Cowood***Surface layer texture:* Channery sandy loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Gneiss or schist residuum*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 0.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Shawmut Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Moderate*Landform:* Alluvial fans, hills, escarpments, and relict stream terraces*Parent material:* Alluvium or colluvium*Slope range:* 8 to 45 percent*Elevation range:* 4,500 to 6,500 feet*Annual precipitation:* 15 to 19 inches*Annual air temperature:* 39 to 43 degrees F*Frost-free period:* 90 to 110 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Shawmut cobbly loam, in an area of Meagher-Shawmut-Bowery complex, 15 to 45 percent slopes, in an area of rangeland, 1,200 feet south and 2,900 feet west of the northeast corner of sec. 4, T. 3 S., R. 6 E.

A—0 to 6 inches; dark brown (10YR 3/3) cobbly loam, very dark brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 20 percent cobbles and 10 percent pebbles; slightly alkaline; clear smooth boundary.

Bt—6 to 14 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; many very fine and few fine roots; common distinct clay films on faces of ped and lining pores; 15 percent cobbles and 25 percent pebbles; slightly alkaline; clear smooth boundary.

Btk—14 to 19 inches; pale brown (10YR 6/3) very gravelly sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine roots; common distinct clay films on faces of ped and lining pores; 20 percent cobbles and 40 percent pebbles; disseminated lime; few fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk1—19 to 28 inches; very pale brown (10YR 7/4) extremely gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; few very fine roots; 20 percent cobbles and 45 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—28 to 60 inches; very pale brown (10YR 7/4) extremely gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; few very fine roots; 20

percent cobbles and 45 percent pebbles; many fine threads of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 16 inches

Depth to the calcic horizon: 9 to 20 inches

A horizon

Hue: 7.5YR or 10YR

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 15 to 50 percent—0 to 10 percent stones; 10 to 25 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 7.5YR or 10YR

Value: 3, 4, or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Texture: Sandy clay loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 60 percent—0 to 10 percent stones; 10 to 20 percent cobbles; 25 to 45 percent pebbles

Reaction: pH 6.6 to 7.8

Btk horizon

Hue: 7.5YR or 10YR

Value: 3, 4, 5, or 6 dry; 2, 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Loam, sandy clay loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 35 to 60 percent—0 to 10 percent stones; 5 to 20 percent cobbles; 30 to 50 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

Bk1 horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy clay loam, or clay loam

Clay content: 15 to 30 percent

Content of rock fragments: 40 to 80 percent—0 to 10 percent stones; 5 to 20 percent cobbles; 35 to 60 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

Bk2 horizon

Hue: 10YR or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy clay loam, or sandy loam

Clay content: 15 to 25 percent

Content of rock fragments: 40 to 80 percent—0 to 10 percent stones; 5 to 20 percent cobbles; 35 to 60 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent

Reaction: pH 7.9 to 8.4

355D—Shawmut cobbly loam, 8 to 15 percent slopes, stony

Setting

Landform: Alluvial fans

Slope: 8 to 15 percent

Elevation: 5,000 to 5,250 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Shawmut and similar soils: 90 percent

Minor Components

Shawmut very stony loam: 0 to 5 percent

Meagher stony loam: 0 to 3 percent

Soils with slopes more than 15 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

639E—Shawmut-Tolbert complex, 15 to 45 percent slopes, very stony

Setting

Landform:

- Shawmut—Hills
- Tolbert—Hills

Slope:

- Shawmut—15 to 45 percent
- Tolbert—15 to 45 percent

Elevation: 4,500 to 6,500 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Shawmut and similar soils: 70 percent

Tolbert and similar soils: 20 percent

Minor Components

Soils with slopes more than 45 percent: 0 to 5 percent

Shawmut bouldery loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Shawmut

Surface layer texture: Very cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.8 inches

Tolbert

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Sandstone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Shurley Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Rapid

Landform: Hills

Parent material: Gneiss or schist colluvium

Slope range: 8 to 35 percent

Elevation range: 4,300 to 5,250 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Sandy-skeletal, mixed, frigid Aridic Haplustepts

Typical Pedon

Shurley very flaggy coarse sandy loam, in an area of Shurley-Rentsac-Rock outcrop complex, 8 to 35 percent slopes, in an area of rangeland, 2,300 feet east of the northwest corner of sec. 20, T. 1 S., R. 1 E.

A—0 to 4 inches; grayish brown (10YR 5/2) very flaggy coarse sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine and few medium roots; 15 percent flagstones and 20 percent channers; neutral; clear smooth boundary.

Bw—4 to 11 inches; yellowish brown (10YR 5/4) very flaggy coarse sandy loam, brown (10YR 4/3) moist; moderate medium angular blocky structure; soft, very friable, nonsticky, and nonplastic; many very fine and few medium roots; 25 percent flagstones and 30 percent channers; slightly alkaline; clear smooth boundary.

Bk—11 to 23 inches; light gray (10YR 7/2) extremely flaggy loamy coarse sand, brown (10YR 5/3) moist; single grain; loose, very friable, nonsticky, and nonplastic; common very fine and few fine and medium roots; 35 percent flagstones and 35 percent channers; common faint lime coatings on undersides of coarse fragments; strongly effervescent; slightly alkaline; gradual irregular boundary.

BC—23 to 60 inches; light gray (10YR 7/2) extremely flaggy loamy coarse sand, light brownish gray (10YR 6/2) moist; single grain; loose, very friable, nonsticky, and nonplastic; few very fine and fine roots; 35 percent flagstones and 35 percent channers; slightly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 12 and 35 inches

Depth to the Bk horizon: 10 to 24 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 60 percent—15 to 30 percent cobbles or flagstones; 20 to 30 percent pebbles or channers

Reaction: pH 6.6 to 8.4

Bw horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Clay content: 5 to 15 percent

Content of rock fragments: 40 to 60 percent—20 to 30 percent cobbles or flagstones; 20 to 30 percent pebbles or channers

Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Loamy coarse sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 85 percent—20 to 40 percent cobbles or flagstones; 20 to 45 percent pebbles or channers

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

BC horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loamy coarse sand or loamy sand

Clay content: 0 to 10 percent

Content of rock fragments: 40 to 85 percent—20 to 40 percent cobbles or flagstones; 20 to 45 percent pebbles or channers

Calcium carbonate equivalent: 3 to 12 percent

Reaction: pH 7.4 to 8.4

729E—Shurley-Rentsac-Rock outcrop complex, 8 to 35 percent slopes

Setting

Landform:

- Shurley—Hills
- Rentsac—Hills
- Rock outcrop—Hills

Slope:

- Shurley—8 to 35 percent
- Rentsac—8 to 35 percent

Elevation: 4,300 to 5,250 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Shurley and similar soils: 40 percent

Rentsac and similar soils: 30 percent

Rock outcrop: 20 percent

Minor Components

Kalsted sandy loam: 0 to 5 percent

Nuley sandy loam: 0 to 5 percent

Major Component Description

Shurley

Surface layer texture: Very flaggy coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.5 inches

Rentsac

Surface layer texture: Very flaggy sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.1 inches

Rock outcrop

Definition: Exposures of gneiss or schist bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Sicklesteets Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Mountains

Parent material: Dolomite colluvium

Slope range: 15 to 60 percent

Elevation range: 5,150 to 7,700 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine, mixed, superactive Ustic Haplocryalfs

Typical Pedon

Sicklesteets cobbly clay loam, in an area of Whitore-Sicklesteets complex, 15 to 40 percent slopes, stony, in an area of forest land, 2,000 feet south and 1,800 feet east of the northwest corner of sec. 3, T. 3 S., R. 6 E.

Oi—0 to 2 inches; intermediately decomposed needles and twigs.

E—2 to 6 inches; brown (10YR 5/3) cobbly clay loam, dark brown (10YR 4/3) moist; moderate fine and medium granular structure; slightly hard, friable, moderately sticky, and moderately plastic; many very fine, common fine and few medium roots; 10 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt—6 to 18 inches; pale olive (5Y 6/3) clay, brown (10YR 5/3) moist; strong medium granular structure; hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium roots; common distinct clay films on faces of peds; 10 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Btk—18 to 21 inches; pale olive (5Y 6/3) clay, light olive brown (2.5Y 5/4) moist; strong fine subangular blocky structure; very hard, firm, moderately sticky, and moderately plastic; common very fine, fine, and medium and few coarse roots; common distinct clay films on faces of peds; 5 percent cobbles and 5 percent pebbles; common medium masses of lime; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk—21 to 44 inches; mixed pale olive and pale yellow (5Y 6/3 and 7/3) clay loam, olive yellow and olive (5Y 5/2 and 5/4) moist; weak fine subangular blocky structure; very hard, firm, moderately sticky, and slightly plastic; common very fine and few fine and medium roots; 5 percent cobbles and 5 percent pebbles; common medium masses of lime; strongly effervescent; slightly alkaline; clear wavy boundary.

2Ck—44 to 60 inches; mixed reddish yellow and pale yellow (5YR 6/6 and 5Y 7/3) extremely gravelly clay loam, yellowish red and olive (5YR 4/6 and 5Y 5/4); massive, very hard, firm, moderately sticky, and moderately plastic; few very fine roots; 25 percent cobbles and 40 percent pebbles; common medium masses of lime; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 15 to 27 inches

E horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 15 to 25 percent—1 to 3 percent stones; 5 to 10 percent cobbles; 5 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Clay content: 40 to 60 percent

Content of rock fragments: 5 to 25 percent—0 to 5 percent stones; 5 to 15 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.3

Btk horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Clay loam

Clay content: 27 to 40 percent

Content of rock fragments: 10 to 35 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 5 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Bk horizon

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Clay content: 27 to 40 percent

Content of rock fragments: 10 to 35 percent—0 to 5 percent stones; 5 to 20 percent cobbles; 5 to 10 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

2Ck horizon

Value: 6 or 7 dry; 4 or 5 moist

Chroma: 3, 4, or 6

Texture: Clay loam or clay

Clay content: 27 to 40 percent

Content of rock fragments: 45 to 70 percent—0 to 5 percent stones; 15 to 25 percent cobbles; 30 to 40 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Soapcreek Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Slow

Landform: Flood plains and stream terraces

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,200 to 6,000 feet

Annual precipitation: 12 to 18 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine, mixed, superactive, frigid
Fluvaquentic Haplustolls

Typical Pedon

Soapcreek silty clay loam, 0 to 2 percent slopes, in an area of hayland, 250 feet north and 300 feet east of the southwest corner of sec. 35, T. 1 N., R. 5 E.

Ap—0 to 15 inches; very dark brown (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; slightly alkaline; clear wavy boundary.

Bk1—15 to 25 inches; grayish brown (10YR 5/2), silty clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; very hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common fine seams of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk2—25 to 37 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; very hard, friable, moderately sticky, and moderately plastic; few fine distinct dark yellowish brown (10YR 4/4) moist redox concentrations; few very fine and fine roots; common fine seams and masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—37 to 46 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; very hard, friable, moderately sticky, and moderately plastic; common fine distinct dark yellowish brown (10YR 4/6) moist redox concentrations; few very fine roots; disseminated lime, few fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bg1—46 to 54 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2); weak fine subangular blocky structure; very hard, friable, moderately sticky, and moderately plastic; common fine distinct dark yellowish brown (10YR 4/4) moist redox concentrations; few very fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

Bg2—54 to 60 inches; grayish brown (10YR 5/2) stratified loam and fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, moderately

sticky, and moderately plastic; few very fine roots; slightly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 15 inches

Depth to seasonal high water table: 24 to 42 inches

Ap horizon

Value: 2 or 3 moist; 3, 4, or 5 dry

Chroma: 1 or 2

Texture: Silty clay or silty clay loam

Clay content: 30 to 50 percent

Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 3 or 4 moist; 4, 5, or 6 dry

Chroma: 1 or 2

Texture: Silty clay or silty clay loam

Clay content: 35 to 50 percent

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

Bg horizons

Hue: 10YR, 2.5Y, or 5Y

Value: 4 or 5 moist; 5 or 6 dry

Chroma: 1 or 2

Texture: Silty clay loam, silty clay, or either with thin layers of fine sandy loam

Clay content: 25 to 45 percent

Reaction: pH 7.4 to 8.4

514A—Soapcreek silty clay loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,200 to 6,000 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Soapcreek and similar soils: 85 percent

Minor Components

Meadowcreek silty clay loam: 0 to 10 percent

Blossberg loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 9.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

507A—Soapcreek-Bonebasin complex, 0 to 2 percent slopes

Setting

Landform:

- Soapcreek—Flood plains
- Bonebasin—Flood plains

Slope:

- Soapcreek—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 5,300 to 5,900 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Soapcreek and similar soils: 60 percent

Bonebasin and similar soils: 30 percent

Minor Components

Meadowcreek silty clay loam: 0 to 5 percent

Reycreek loam: 0 to 3 percent

Blossberg loam: 0 to 2 percent

Major Component Description

Soapcreek

Surface layer texture: Silty clay

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 9.6 inches

Bonebasin

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Sourdough Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Alluvial fans and stream terraces

Parent material: Alluvium

Slope range: 0 to 4 percent

Elevation range: 4,950 to 5,750 feet

Annual precipitation: 18 to 22 inches

Annual air temperature: 37 to 41 degrees F

Frost-free period: 80 to 95 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Sourdough loam, 0 to 4 percent slopes, in an area of hayland, 200 feet south and 500 feet west of the northeast corner of sec. 10, T. 3 S., R. 5 E.

A—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine, common fine, and few medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

AB—8 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky, and slightly plastic; many

very fine and common fine and medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt1—12 to 15 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and slightly plastic; many very fine, common fine, and few medium roots; common faint clay films on faces of peds and lining pores; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt2—15 to 26 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 5 percent cobbles and 5 percent pebbles; neutral; clear wavy boundary.

Bt3—26 to 36 inches; brown (10YR 5/3) cobbly silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; common faint clay films on faces of peds and lining pores; 10 percent cobbles and 10 percent pebbles; neutral; clear wavy boundary.

2C—36 to 60 inches; brown (10YR 5/3) extremely cobbly loamy coarse sand, dark brown (10YR 3/3) moist; massive; loose, nonsticky, and nonplastic; common very fine and few fine roots; 5 percent stones, 35 percent cobbles, and 30 percent pebbles; common distinct lime coatings on undersides of coarse fragments; slightly alkaline.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 15 inches and includes all or part of the argillic horizon

Depth to the 2C horizon: 20 to 40 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

AB horizon

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silty clay loam, silt loam, or loam
 Clay content: 18 to 30 percent
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
 Reaction: pH 6.1 to 7.3

Bt1 and Bt2 horizons

Value: 4 or 5 dry; 3 or 4 moist
 Chroma: 2, 3, or 4
 Texture: Silty clay loam or clay loam
 Clay content: 27 to 35 percent
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
 Reaction: pH 6.6 to 7.3

Bt3 horizon

Value: 4 or 5 dry; 3 or 4 moist
 Chroma: 2, 3, or 4
 Texture: Silty clay loam, clay loam, or silt loam
 Clay content: 25 to 35 percent
 Content of rock fragments: 10 to 30 percent—5 to 15 percent cobbles; 5 to 15 percent pebbles
 Reaction: pH 6.6 to 7.3

2C horizon

Value: 5 or 6 dry; 3 or 4 moist
 Chroma: 2, 3, or 4
 Texture: Loamy coarse sand or coarse sand
 Clay content: 0 to 10 percent
 Content of rock fragments: 40 to 80 percent—5 to 10 percent stones; 20 to 40 percent cobbles; 20 to 50 percent pebbles
 Reaction: pH 6.6 to 7.8

**357B—Sourdough loam,
0 to 4 percent slopes**

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 4 percent
Elevation: 4,950 to 5,750 feet
Mean annual precipitation: 18 to 22 inches
Frost-free period: 80 to 95 days

Composition

Major Components

Sourdough and similar soils: 90 percent

Minor Components

Hyalite loam: 0 to 5 percent
 Beaverton cobbly loam: 0 to 3 percent
 Turner loam, moderately wet: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Spanpeak Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Hills
Parent material: Gneiss or schist colluvium
Slope range: 25 to 60 percent
Elevation range: 5,000 to 7,200 feet
Annual precipitation: 17 to 24 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Argicryolls

Typical Pedon

Spanpeak coarse sandy loam, in an area of Spanpeak-Bavdark coarse sandy loams, 25 to 50 percent slopes, in an area of forest land, 200 feet south and 600 feet west of the northeast corner of sec. 1, T. 4 S., R. 3 E.

Oi—0 to 2 inches; forest litter of slightly decomposed leaves, needles, and twigs.

A—2 to 16 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark gray (10YR 3/1) moist; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine, common medium, and few coarse roots; many very fine and common fine pores; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

BA—16 to 25 inches; brown (10YR 5/3) gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky, and

nonplastic; common medium and few very fine, fine, and coarse roots; many very fine and common fine and medium pores; 5 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bt—25 to 33 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; common medium and few coarse roots; common very fine and fine and few medium pores; few faint clay films on faces of peds and pebble surfaces; 20 percent cobbles and 20 percent pebbles; neutral; clear smooth boundary.

C—33 to 60 inches; grayish brown (10YR 5/2) very gravelly loamy coarse sand, brown (10YR 4/3) moist; massive; loose, nonsticky, and nonplastic; few coarse roots; common very fine, fine, and medium pores; 15 percent cobbles and 30 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 8 and 24 inches

Mollic epipedon thickness: 10 to 15 inches

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 12 to 18 percent

Content of rock fragments: 5 to 25 percent—0 to 3 percent stones; 0 to 10 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

BA horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 12 to 20 percent

Content of rock fragments: 10 to 25 percent—5 to 10 percent cobbles; 5 to 15 percent pebbles

Reaction: pH 6.1 to 7.3

Bt horizon

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 20 to 30 percent

Content of rock fragments: 35 to 60 percent—15 to 25 percent cobbles; 20 to 35 percent pebbles

Reaction: pH 6.1 to 7.3

C horizon

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Coarse sandy loam or loamy coarse sand

Clay content: 5 to 15 percent

Content of rock fragments: 35 to 60 percent—15 to 25 percent cobbles; 20 to 35 percent pebbles

Reaction: pH 6.1 to 7.3

278F—Spanpeak coarse sandy loam, 35 to 60 percent slopes

Setting

Landform: Hills

Slope: 35 to 60 percent

Elevation: 5,200 to 6,850 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Spanpeak and similar soils: 85 percent

Minor Components

Shadow stony coarse sandy loam: 0 to 8 percent

Cowood very stony sandy loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

778F—Spanpeak-Bavdark coarse sandy loams, 25 to 50 percent slopes

Setting

Landform:

- Spanpeak—Hills
- Bavdark—Hills

Slope:

- Spanpeak—25 to 50 percent
- Bavdark—25 to 50 percent

Elevation: 5,000 to 7,200 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Spanpeak and similar soils: 60 percent

Bavdark and similar soils: 30 percent

Minor Components

Cowood very stony sandy loam: 0 to 5 percent

Shadow and similar soils: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Spanpeak

Surface layer texture: Coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Gneiss or schist colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 5.1 inches

Bavdark

Surface layer texture: Coarse sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Stemple Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Mountains

Parent material: Alpine till or sandstone colluvium

Slope range: 15 to 60 percent

Elevation range: 5,350 to 8,200 feet

Annual precipitation: 20 to 30 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive
Typic Palecryalfs

Typical Pedon

Stemple cobbly sandy loam, 35 to 60 percent slopes, stony, in an area of forest land, 2,300 feet north and 2,400 feet east of the southwest corner of sec. 22, T. 6 S., R. 3 E.

Oi—0 to 2 inches; forest litter.

E1—2 to 9 inches; light gray (10YR 7/2) cobbly sandy loam, brown (10YR 5/3) moist; weak fine subangular blocky structure breaking to moderate medium granular structure; soft, very friable, nonsticky, and nonplastic; many very fine and fine and few medium and coarse roots; 5 percent stones, 15 percent cobbles, and 15 percent pebbles; moderately acid; clear wavy boundary.

E2—9 to 25 inches; light gray (10YR 7/2) very cobbly sandy loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium and coarse roots; 5 percent stones, 30 percent cobbles, and 15 percent pebbles; slightly acid; clear wavy boundary.

E/Bt—25 to 32 inches; E part: light gray (10YR 7/2) very gravelly coarse sandy loam, brown (10YR 5/3) moist; Bt part: yellowish brown (10YR 5/4) very gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky, and moderately plastic; few very fine, fine, and medium roots; 15 percent cobbles and 30 percent pebbles; slightly acid; clear smooth boundary.

Bt—32 to 60 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of peds; 10 percent cobbles and 30 percent pebbles; neutral.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bt horizon: 25 to 50 inches

E1 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 10 to 20 percent

Content of rock fragments: 20 to 50 percent—2 to 5 percent stones; 5 to 15 percent cobbles; 15 to 45 percent pebbles

Reaction: pH 5.1 to 6.5

E2 horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loam or sandy loam

Clay content: 10 to 20 percent

Content of rock fragments: 35 to 80 percent—0 to 10 percent stones; 5 to 25 percent cobbles; 15 to 60 percent pebbles

Reaction: pH 5.1 to 6.5

E/Bt horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: E part 6, 7, or 8 dry; 4, 5, or 6 moist; Bt part 5 or 6 dry; 4 or 5 moist

Chroma: E part 2, 3, or 4; B part 4, 5, or 6

Texture: Loam, coarse sandy loam, sandy loam, or sandy clay loam

Clay content: 15 to 27 percent

Content of rock fragments: 35 to 80 percent—5 to 30 percent cobbles; 30 to 50 percent pebbles

Reaction: pH 5.1 to 6.5

Bt horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 4, 5, or 6

Texture: Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 40 to 80 percent—10 to 30 percent cobbles; 30 to 50 percent pebbles

Reaction: pH 5.6 to 7.3

293E—Stemple cobbly sandy loam, 15 to 35 percent slopes, stony

Setting

Landform: Mountains

Slope: 15 to 35 percent

Elevation: 5,600 to 8,000 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Stemple and similar soils: 85 percent

Minor Components

Stemple bouldery sandy loam: 0 to 10 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alpine till or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

293F—Stemple cobbly sandy loam, 35 to 60 percent slopes, stony

Setting

Landform: Mountains

Slope: 35 to 60 percent

Elevation: 5,800 to 8,200 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Stemple and similar soils: 85 percent

Minor Components

Stemple bouldery sandy loam: 0 to 10 percent

Soils with slopes more than 60 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly sandy loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alpine till or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

493F—Stemple very cobbly loam, 25 to 60 percent slopes, stony

Setting

Landform: Mountains

Slope: 25 to 60 percent

Elevation: 5,350 to 6,650 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Stemple and similar soils: 85 percent

Minor Components

Stemple bouldery loam: 0 to 7 percent

Cowood very stony loam: 0 to 5 percent

Rubble land: 0 to 3 percent

Major Component Description

Surface layer texture: Very cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Storyhill Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Relict stream terraces and hills

Parent material: Alluvium and colluvium

Slope range: 4 to 45 percent

Elevation range: 4,750 to 6,100 feet

Annual precipitation: 18 to 22 inches

Annual air temperature: 37 to 41 degrees F

Frost-free period: 80 to 95 days

Taxonomic Class: Clayey-skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Storyhill cobbly loam, in an area of Bigbear-Storyhill-Adel complex, 15 to 45 percent slopes, in an area of rangeland, 600 feet north and 400 feet east of the southwest corner of sec. 33, T. 1 S., R. 6 E.

A—0 to 10 inches; very dark grayish brown (10YR 3/2) cobbly loam, black (10YR 2/1) moist; moderate fine subangular blocky structure parting to strong medium granular; soft, friable, moderately sticky, and very plastic; many very fine roots, common fine, and medium roots, few coarse roots; 10 percent cobbles and 10 percent pebbles; slightly acid; clear smooth boundary.

Bt1—10 to 21 inches; yellowish brown (10YR 5/4) very cobbly clay, dark yellowish brown (10YR 3/4) moist; moderate medium prismatic structure; slightly hard, very firm, very sticky, and very plastic; common very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 20 percent cobbles and 20 percent pebbles; neutral; gradual wavy boundary.

Bt2—21 to 32 inches; yellowish brown (10YR 5/4) very cobbly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very firm, moderately sticky, and very plastic; common very fine and few fine roots; common distinct clay films on faces of peds and lining pores; 20 percent cobbles and 25 percent pebbles; slightly alkaline; clear wavy boundary.

Bk—32 to 60 inches; pale brown (10YR 6/3) very cobbly sandy clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; few very fine and fine roots; 30 percent cobbles and 30 percent pebbles; common fine threads of lime, common lime coatings on coarse fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 39 to 43 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 15 inches

Depth to the Bk horizon: 20 to 40 inches

A horizon

Value: 3 or 4 dry; 2 or 3 moist

Clay content: 20 to 27 percent

Content of rock fragments: 15 to 45 percent—0 to 10 percent stones; 10 to 20 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.1 to 7.3

Bt horizons

Value: 4 or 5 dry; 3 or 4 moist
 Chroma: 3 or 4
 Texture: Clay or clay loam
 Clay content: 35 to 50 percent
 Content of rock fragments: 35 to 60 percent—0 to 5 percent stones; 15 to 30 percent cobbles; 15 to 30 percent pebbles
 Reaction: pH 6.1 to 7.8

Bk horizon

Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 or 3
 Texture: Clay loam or sandy clay loam
 Clay content: 30 to 40 percent
 Content of rock fragments: 40 to 70 percent—0 to 5 percent stones; 20 to 40 percent cobbles; 20 to 30 percent pebbles
 Calcium carbonate equivalent: 15 to 30 percent
 Reaction: pH 7.4 to 8.4

**365E—Storyhill, very stony-
 Bigbear, stony-Adel complex,
 15 to 45 percent slopes**

Setting*Landform:*

- Storyhill—Hills
- Bigbear—Hills
- Adel—Hills

Slope:

- Storyhill—15 to 45 percent
- Bigbear—15 to 45 percent
- Adel—15 to 45 percent

Elevation: 5,100 to 6,050 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 65 to 95 days

Composition**Major Components**

Storyhill and similar soils: 40 percent

Biggear and similar soils: 25 percent

Adel and similar soils: 20 percent

Minor Components

Alder clay loam: 0 to 5 percent

Soils with slopes less than 15 percent: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Major Component Description**Storyhill**

Surface layer texture: Very cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.6 inches

Biggear

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.5 inches

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**665D—Storyhill-Biggear complex,
 4 to 15 percent slopes**

Setting*Landform:*

- Storyhill—Hills
- Bigbear—Hills

Slope:

- Storyhill—4 to 15 percent
- Bigbear—4 to 15 percent

Elevation: 4,750 to 6,000 feet

Mean annual precipitation: 18 to 22 inches

Frost-free period: 80 to 95 days

Composition**Major Components**

Storyhill and similar soils: 50 percent

Biggear and similar soils: 35 percent

Minor Components

Bowery loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Storyhill very stony loam: 0 to 5 percent

Major Component Description

Storyhill

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 6.1 inches

Bigbear

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Straw Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 4 percent

Elevation range: 4,350 to 6,150 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Cumulic Haplustolls

Typical Pedon

Straw loam, 0 to 4 percent slopes, in an area of cropland, 1,300 feet south and 1,200 feet west of the northeast corner of sec. 2, T. 1 N., R. 5 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; slightly alkaline; abrupt smooth boundary.

A2—6 to 18 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; slightly alkaline; clear wavy boundary.

Bk1—18 to 30 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine roots; few fine threads of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Bk2—30 to 38 inches; pale brown (10YR 6/3) loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; disseminated lime, few fine threads of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

BC1—38 to 50 inches; yellowish brown (10YR 5/4) loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine roots; slightly alkaline; gradual wavy boundary.

BC2—50 to 60 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/3) moist; massive; slightly hard, friable, moderately sticky, and moderately plastic; few very fine roots; slightly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 16 to 28 inches

Depth to the Bk horizon: 16 to 30 inches

A horizons

Hue: 10YR or 2.5Y

Value: 3 or 4 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Loam or silty clay loam

Clay content: 20 to 35 percent

Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Loam, silt loam, or clay loam

Clay content: 20 to 35 percent

Calcium carbonate equivalent: 3 to 15 percent

Reaction: pH 7.4 to 8.4

BC horizons

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2, 3, or 4
 Texture: Loam, silt loam, or clay loam
 Clay content: 20 to 35 percent
 Reaction: pH 6.6 to 8.4

64B—Straw loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces
Slope: 0 to 4 percent
Elevation: 4,350 to 6,150 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Straw and similar soils: 90 percent

Minor Components

Enbar loam: 0 to 5 percent
 Sudworth loam: 0 to 3 percent
 Straw clay loam: 0 to 2 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

364B—Straw silty clay loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces
Slope: 0 to 4 percent
Elevation: 4,400 to 5,100 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Straw and similar soils: 85 percent

Minor Components

Enbar clay loam: 0 to 10 percent
 Sudworth silty clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 10.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Sudworth Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate above the 2Ck horizon and rapid below
Landform: Stream terraces and flood plains
Parent material: Alluvium
Slope range: 0 to 2 percent
Elevation range: 4,300 to 5,800 feet
Annual precipitation: 15 to 19 inches
Annual air temperature: 39 to 43 degrees F
Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy over sandy or sandy skeletal, mixed, superactive, frigid Cumulic Haplustolls

Typical Pedon

Sudworth loam, in an area of Sudworth-Nesda loams, 0 to 2 percent slopes, in an area of hayland, 2,500 feet north and 2,120 feet west of the southeast corner of sec. 14, T. 2 S., R. 4 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; many very fine and common fine roots; slightly alkaline; clear smooth boundary.
 A2—7 to 18 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; very hard,

friable, slightly sticky, and slightly plastic; common very fine roots; slightly alkaline; clear smooth boundary.

A3—18 to 24 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; very hard, friable, slightly sticky, and slightly plastic; common very fine and few fine roots; slightly alkaline; abrupt wavy boundary.

Bk—24 to 29 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; common very fine and few fine roots; common fine masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

2Ck—29 to 35 inches; grayish brown (10YR 5/2) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky, and nonplastic; few very fine and fine roots; 15 percent cobbles and 35 percent pebbles; common distinct lime casts on coarse fragments; slightly effervescent; moderately alkaline; clear smooth boundary.

2C—35 to 60 inches; variegated extremely gravelly sand; single grain; loose, nonsticky, and nonplastic; few very fine and fine roots; 20 percent cobbles and 50 percent pebbles; mildly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 16 to 36 inches

Depth to seasonal high water table: 4 to 8 feet

Depth to the 2C horizon: 20 to 40 inches

A horizons

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Texture: Loam or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 7.4 to 8.4

Bk horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Loam or silt loam

Clay content: 18 to 27 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

2C horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 1, 2, 3, or 4

Texture: Loamy sand or sand

Clay content: 2 to 7 percent

Content of rock fragments: 35 to 80 percent—0 to 30 percent stones and cobbles; 35 to 50 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 7.4 to 8.4

307A—Sudworth silty clay loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,400 to 4,650 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Sudworth and similar soils: 85 percent

Minor Components

Enbar loam: 0 to 5 percent

Nesda loam: 0 to 5 percent

Turner loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 6.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

407A—Sudworth-Nesda loams, 0 to 2 percent slopes

Setting

Landform:

- Sudworth—Flood plains
- Nesda—Flood plains

Slope:

- Sudworth—0 to 2 percent
- Nesda—0 to 2 percent

Elevation: 4,300 to 5,800 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Sudworth and similar soils: 60 percent

Nesda and similar soils: 25 percent

Minor Components

Meadowcreek loam: 0 to 8 percent

Enbar loam: 0 to 5 percent

Bonebasin loam: 0 to 2 percent

Major Component Description

Sudworth

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 6.9 inches

Nesda

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 3.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Tamaneen Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Relict stream terraces

Parent material: Alluvium

Slope range: 0 to 4 percent

Elevation range: 5,300 to 5,900 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine, smectitic, frigid Typic
Argiustolls

Typical Pedon

Tamaneen cobbly clay loam, 0 to 4 percent slopes, in an area of rangeland, 1,200 feet north and 200 feet east of the southwest corner of sec. 28, T. 2 N., R. 10 E. in Park County, Montana.

A—0 to 4 inches; dark grayish brown (10YR 4/2) cobbly clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, slightly sticky, and slightly plastic; many very fine, fine, and medium roots; 10 percent cobbles and 10 percent pebbles; neutral; clear smooth boundary.

Bt1—4 to 8 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine, fine, and medium roots; few faint clay films on faces of ped; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt2—8 to 12 inches; brown (10YR 5/3) clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky, and very plastic; common very fine and fine roots; common distinct clay films on faces of ped; 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bt3—12 to 17 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) moist; strong fine angular blocky structure; very hard, very firm, very sticky, and very plastic; common very fine and fine roots; common distinct clay films on faces of ped; 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bk—17 to 22 inches; light brownish gray (2.5Y 6/2) gravelly clay loam, dark grayish brown (2.5Y 4/2)

moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine roots; 5 percent cobbles and 15 percent pebbles; common distinct lime coatings on coarse fragments; strongly effervescent, moderately alkaline; clear smooth boundary.

2Ck1—22 to 30 inches; light brownish gray (2.5Y 6/2) very cobbly loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; 20 percent cobbles and 25 percent pebbles; common distinct lime coatings on coarse fragments; violently effervescent; moderately alkaline; abrupt smooth boundary.

2Ck2—30 to 60 inches; light gray (2.5Y 7/2) extremely cobbly sandy loam, grayish brown (2.5Y 5/3) moist; massive; soft, very friable, nonsticky, and nonplastic; 40 percent cobbles and 30 percent pebbles; common distinct lime coatings on coarse fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 8 to 16 inches

Depth to the calcic horizon: 12 to 24 inches

Depth to the 2C horizon: 17 to 40 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 25 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizons

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2 or 3

Texture: Clay loam, silty clay loam, or silty clay

Clay content: 30 to 45 percent

Content of rock fragments: 5 to 20 percent—0 to 5 percent cobbles; 5 to 15 percent pebbles

Calcium carbonate equivalent: 20 to 30 percent

Reaction: pH 7.4 to 8.4

2Ck horizons

Hue: 10YR or 2.5Y

Value: 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Clay loam, sandy clay loam, loam, or sandy loam

Clay content: 8 to 30 percent

Content of rock fragments: 35 to 80 percent—15 to 40 percent cobbles; 20 to 40 percent pebbles

Calcium carbonate equivalent: 25 to 40 percent

Reaction: pH 7.9 to 8.4

158B—Tamaneen clay loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces

Slope: 0 to 4 percent

Elevation: 5,300 to 5,550 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Tamaneen and similar soils: 90 percent

Minor Components

Shawmut very cobbly loam: 0 to 5 percent

Tamaneen cobbly loam: 0 to 3 percent

Work clay loam: 0 to 2 percent

Major Component Description

Surface layer texture: Clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

358B—Tamaneen cobbly clay loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces

Slope: 0 to 4 percent

Elevation: 5,300 to 5,900 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Tamaneen and similar soils: 90 percent

Minor Components

Shawmut cobbly clay loam: 0 to 5 percent

Tamaneen very cobbly clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Tanna Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Sedimentary plains, hills, and escarpments

Parent material: Semiconsolidated, clayey sedimentary beds

Slope range: 4 to 35 percent

Elevation range: 4,100 to 5,050 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Fine, smectitic, frigid Aridic Argiustolls

Typical Pedon

Tanna clay loam, 4 to 8 percent slopes, in an area of cropland, 1,300 feet north and 400 feet east of the southwest corner of sec. 25, T. 1 N., R. 1 E.

Ap—0 to 3 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine and fine and common medium roots; 5 percent pebbles; slightly alkaline; clear smooth boundary.

Bt1—3 to 7 inches; dark grayish brown (10YR 4/2) clay, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; many very fine and fine and few medium roots; common distinct clay films on faces of peds and lining pores; 5 percent pebbles; slightly alkaline; clear wavy boundary.

Bt2—7 to 12 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure; very hard, very firm, very sticky, and very plastic; common very fine and few fine and medium roots; many distinct clay films on faces of peds and lining pores; 5 percent pebbles; moderately alkaline; clear wavy boundary.

Bk—12 to 28 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate medium prismatic structure; very hard, firm, moderately sticky, and moderately plastic; few very fine and fine roots; 10 percent paralithic chips in lower part; few medium masses of lime; strongly effervescent; strongly alkaline; clear wavy boundary.

Cr1—28 to 35 inches; light gray (2.5Y 7/2) semiconsolidated, clayey sedimentary beds that crush to silty clay loam, gray (2.5Y 6/2) moist; few gypsum crystals, few fine soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cr2—35 to 60 inches; light gray (2.5Y 7/2) semiconsolidated, clayey sedimentary beds that crush to silty clay loam, gray (2.5Y 6/2) moist; slightly alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 12 inches
Depth to paralithic contact: 20 to 40 inches
Depth to the Bk horizon: 11 to 18 inches

A horizon

Hue: 10YR or 2.5Y
 Value: 2 or 3 moist
 Chroma: 2 or 3
 Clay content: 27 to 35 percent
 Content of rock fragments: 0 to 25 percent—0 to 15 percent cobbles; 0 to 10 percent pebbles
 Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 10YR or 2.5Y
 Value: 4, 5, or 6 dry; 3 or 4 moist
 Chroma: 2 or 3
 Texture: Clay loam, clay, or silty clay
 Clay content: 35 to 45 percent
 Content of rock fragments: 0 to 5 percent pebbles
 Reaction: pH 6.6 to 8.4

Bk horizon

Hue: 10YR or 2.5Y
 Value: 5 or 6 dry; 4 or 5 moist
 Chroma: 2 or 3
 Texture: Clay loam or silty clay loam
 Clay content: 30 to 40 percent
 Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles
 Calcium carbonate equivalent: 5 to 15 percent
 Reaction: pH 7.4 to 9.0

40C—Tanna clay loam, 4 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 4 to 8 percent
Elevation: 4,350 to 4,600 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Tanna and similar soils: 85 percent

Minor Components

Cabbart loam: 0 to 5 percent
 Patouza clay: 0 to 5 percent
 Soils with slopes more than 8 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, clayey sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

740D—Tanna-Udecide complex, 8 to 15 percent slopes

Setting

Landform:

- Tanna—Hills
- Udecide—Hills

Slope:

- Tanna—8 to 15 percent
- Udecide—8 to 15 percent

Elevation: 4,350 to 5,050 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Tanna and similar soils: 45 percent
 Udecide and similar soils: 40 percent

Minor Components

Cabbart loam: 0 to 8 percent
 Headwaters loam: 0 to 5 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Tanna

Surface layer texture: Clay loam
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Semiconsolidated, clayey sedimentary beds
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.8 inches

Udecide

Surface layer texture: Sandy clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

740E—Tanna-Udecide complex, 15 to 35 percent slopes

Setting

Landform:

- Tanna—Escarpments
- Udecide—Escarpments

Slope:

- Tanna—15 to 35 percent
- Udecide—15 to 35 percent

Elevation: 4,100 to 4,900 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition**Major Components**

Tanna and similar soils: 45 percent

Udecide and similar soils: 40 percent

Minor Components

Cabbart loam: 0 to 8 percent

Kalsted sandy loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Tanna**

Surface layer texture: Cobbly clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, clayey sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.7 inches

Udecide

Surface layer texture: Cobbly sandy clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Tetonview Series

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Permeability: Moderately slow

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,100 to 5,250 feet

Annual precipitation: 12 to 18 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 90 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aeric Calciaquolls

Typical Pedon

Tetonview silt loam, 0 to 2 percent slopes, in an area of rangeland, 2,700 feet north and 2,500 feet east of the southwest corner of sec. 24, T. 1 N., R. 4 E.

Oi—0 to 2 inches; slightly decomposed fibers and roots of sedges and rushes.

A—2 to 10 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; weak fine platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium and coarse roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—10 to 23 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; disseminated lime, few

fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bkg—23 to 36 inches; light gray (10YR 6/1) silt loam, dark grayish brown (10YR 4/2) moist; few fine faint (10YR 5/4) redox concentrations; weak fine subangular blocky structure; hard, very friable, slightly sticky, and slightly plastic; few very fine and fine roots; disseminated lime, few fine masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cg—36 to 60 inches; gray (N 5/) silty clay loam, dark grayish brown (10YR 4/2) moist; many fine faint (10YR 5/4) redox concentrations; massive; very hard, firm, moderately sticky, and moderately plastic; 5 percent pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 23 inches

Depth to seasonal high water table: 12 to 24 inches

Depth to the Bk horizon: 7 to 13 inches

A horizon

Hue: 10YR or 2.5Y

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Texture: Silt loam or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 5 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 3, 4, 5, or 6 moist

Chroma: 1, 2, or 3

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 15 percent pebbles

Calcium carbonate equivalent: 15 to 35 percent

Reaction: pH 7.9 to 8.4

Cg horizon

Hue: 10YR, 2.5Y, 5Y, or N

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 1 or 2

Texture: Loam, silt loam, or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.9 to 8.4

538A—Tetonview silt loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,150 to 4,450 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Tetonview and similar soils: 85 percent

Minor Components

Lamoose silt loam: 0 to 5 percent

Newtman mucky peat: 0 to 5 percent

Saypo silt loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 10.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

539A—Tetonview silt loam, 0 to 2 percent slopes, drained

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,100 to 4,400 feet

Mean annual precipitation: 12 to 16 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Tetonview and similar soils: 85 percent

Minor Components

Newtman mucky peat: 0 to 10 percent

Saypo silt loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 10.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

540A—Tetonview-Newtman complex, 0 to 2 percent slopes

Setting

Landform:

- Tetonview—Stream terraces
- Newtman—Stream terraces

Slope:

- Tetonview—0 to 2 percent
- Newtman—0 to 2 percent

Elevation: 4,100 to 5,150 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Tetonview and similar soils: 50 percent

Newtman and similar soils: 40 percent

Minor Components

Saypo silt loam: 0 to 5 percent

Threeriv loam: 0 to 5 percent

Major Component Description

Tetonview

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 10.1 inches

Newtman

Surface layer texture: Mucky peat

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 6.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Threeriv Series

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Permeability: Moderately slow

Landform: Flood plains

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 4,000 to 6,100 feet

Annual precipitation: 10 to 18 inches

Annual air temperature: 39 to 41 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid
Typic Fluvaquents

Typical Pedon

Threeriv loam, in an area of Threeriv-Bonebasin loams, 0 to 2 percent slopes, rare flooding, in an area of pasture, 2,200 feet south and 200 feet west of the northeast corner of sec. 2, T. 1 N., R. 1 E.

Oe—0 to 4 inches; partially decomposed sedges, rushes, and grasses; slightly alkaline; clear smooth boundary.

Ag—4 to 9 inches; dark gray (10YR 4/1) loam, gray (10YR 5/1) dry; few fine prominent brown (7.5YR

4/4) redox concentrations; weak medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; common medium roots and few very fine and fine roots; 10 percent pebbles; strongly effervescent; moderately alkaline.

Cg—9 to 29 inches; light brownish gray (10YR 6/2) sandy clay loam consisting of strata of sandy clay loam and sandy loam; light gray (10YR 7/2) dry; common fine prominent dark yellowish brown (10YR 4/6) redox concentrations; massive; hard, friable, slightly sticky, and slightly plastic; few very fine, fine, and medium roots; 10 percent pebbles; violently effervescent; moderately alkaline; clear smooth boundary.

2C—29 to 60 inches; variegated extremely gravelly loamy sand, single grain; loose, nonsticky, and nonplastic; 15 percent cobbles and 60 percent pebbles; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Depth to seasonal high water table: Ponded to 12 inches

Depth to the 2C horizon: 20 to 40 inches

Ag horizon

Hue: 10YR, N, or 5Y

Value: 3 or 4 moist; 5 or 6 dry

Texture: Loam or silty clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.9 to 8.4

Cg horizon

Hue: 10YR, 5Y, or 2.5Y

Value: 4, 5, or 6 moist; 5, 6 or 7 dry

Chroma: 1 or 2

Texture: Stratified sandy clay loam, sandy loam, silty clay loam, or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 10 percent pebbles

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.9 to 8.4

2C horizon

Hue: 10YR or variegated

Value: 4 or 5 moist; 5 or 6 dry

Texture: Loamy sand, loamy coarse sand, sand, or coarse sand

Clay content: 0 to 10 percent

Content of rock fragments: 35 to 85 percent—10 to 25 percent cobbles; 25 to 60 percent pebbles

Reaction: pH 7.9 to 8.4

556A—Threeriv-Bonebasin loams, 0 to 2 percent slopes

Setting

Landform:

- Threeriv—Flood plains
- Bonebasin—Flood plains

Slope:

- Threeriv—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 4,000 to 6,100 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Threeriv and similar soils: 45 percent

Bonebasin and similar soils: 45 percent

Minor Components

Blossberg loam: 0 to 5 percent

Strongly saline soils: 0 to 5 percent

Major Component Description

Threeriv

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 5.3 inches

Bonebasin

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

559A—Threeriv-Bonebasin loams, 0 to 2 percent slopes, irrigation induced wetness

Setting

Landform:

- Threeriv—Stream terraces
- Bonebasin—Stream terraces

Slope:

- Threeriv—0 to 2 percent
- Bonebasin—0 to 2 percent

Elevation: 4,100 to 4,650 feet

Mean annual precipitation: 12 to 18 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Threeriv and similar soils: 45 percent

Bonebasin and similar soils: 45 percent

Minor Components

Blossberg loam: 0 to 5 percent

Fairway loam: 0 to 5 percent

Major Component Description

Threeriv

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 5.3 inches

Bonebasin

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 6.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

561A—Threeriv-Greycliff complex, 0 to 2 percent slopes

Setting

Landform:

- Threeriv—Stream terraces
- Greycliff—Stream terraces

Slope:

- Threeriv—0 to 2 percent
- Greycliff—0 to 2 percent

Elevation: 4,000 to 4,300 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Threeriv and similar soils: 65 percent

Greycliff and similar soils: 20 percent

Minor Components

Bigsandy silty clay loam: 0 to 10 percent

Reycreek loam: 0 to 5 percent

Major Component Description

Threeriv

Surface layer texture: Silty clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: Rare

Water table: Apparent

Available water capacity: Mainly 5.4 inches

Greycliff

Surface layer texture: Silt loam

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Sodium affected: Sodic within 30 inches

Available water capacity: Mainly 5.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Tiban Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Mountains and hills

Parent material: Sandstone, dolomite, or argillite colluvium

Slope range: 4 to 70 percent

Elevation range: 4,300 to 7,300 feet

Annual precipitation: 17 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustic Haplocryolls

Typical Pedon

Tiban channery loam, in an area of Tiban-Castner channery loams, 45 to 70 percent slopes, in an area of forest land, 1,600 feet north and 1,300 feet east of the southwest corner of sec. 11, T. 3 N., R. 3 E.

Oi—0 to 4 inches; moderately decomposed needles and twigs.

A—4 to 16 inches; very dark grayish brown (10YR 3/2) channery loam; black (10YR 2/1) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 15 percent channers; neutral; gradual wavy boundary.

Bw1—16 to 19 inches; dark grayish brown (10YR 4/2) channery loam, dark brown (10YR 3/3) moist; moderate very fine and fine subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many fine and common medium roots; 30 percent channers; neutral; clear wavy boundary.

Bw2—19 to 29 inches; yellowish brown (10YR 5/4) very channery loam, dark yellowish brown (10YR 4/4) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common fine and medium and few coarse roots; 5 percent flagstones and 45 percent channers; neutral; abrupt smooth boundary.

Bk1—29 to 44 inches; very pale brown (10YR 7/3) very channery loam, pale brown (10YR 6/3) moist;

moderate fine and very fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common medium and few fine and coarse roots; 10 percent flagstones and 45 percent channers; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—44 to 60 inches; pale brown (10YR 6/3) extremely channery loam, brown (10YR 5/3) moist; massive; loose, nonsticky, and nonplastic; few medium and coarse roots; 15 percent flagstones and 50 percent channers; common fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the Bk horizon: 15 to 30 inches

A horizon

Hue: 10YR to 2.5YR

Value: 3, 4, or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 25 percent—0 to 5 percent stones; 5 to 20 percent channers or pebbles

Reaction: pH 6.1 to 7.3

Bw horizons

Hue: 10YR to 2.5YR

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 1, 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 25 to 55 percent—0 to 10 percent stones; 0 to 5 percent cobbles or flagstones; 25 to 50 percent channers or pebbles

Reaction: pH 6.6 to 7.3

Bk horizons

Hue: 10YR to 2.5YR

Value: 6, 7, or 8 dry; 5 or 6 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 50 to 80 percent—0 to 10 percent stones; 10 to 20 percent flagstones or cobbles; 40 to 60 percent channers or pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.9 to 8.4

680F—Tiban cobbly loam, 35 to 60 percent slopes, stony

Setting

Landform: Mountains
Slope: 35 to 60 percent
Elevation: 5,000 to 7,300 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Tiban and similar soils: 85 percent

Minor Components

Soils 40 inches or less deep to bedrock: 0 to 8 percent
 Accola loam: 0 to 5 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Dolomite colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 5.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

678E—Tiban, stony-Bridger complex, 4 to 25 percent slopes

Setting

Landform:
 • Tiban—Hills
 • Bridger—Drainageways
Slope:
 • Tiban—4 to 25 percent
 • Bridger—4 to 25 percent
Elevation: 5,600 to 6,450 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Tiban and similar soils: 50 percent
 Bridger and similar soils: 35 percent

Minor Components

Tiban very stony loam: 0 to 8 percent
 Copenhaver and similar soils: 0 to 5 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Tiban

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Sandstone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 5.4 inches

Bridger

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 7.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

461G—Tiban-Adel complex, 40 to 70 percent slopes

Setting

Landform:
 • Tiban—Hills
 • Adel—Hills
Slope:
 • Tiban—40 to 70 percent
 • Adel—40 to 60 percent
Elevation: 4,600 to 5,850 feet
Mean annual precipitation: 20 to 24 inches
Frost-free period: 50 to 70 days

Composition

Major Components

Tiban and similar soils: 60 percent
 Adel and similar soils: 30 percent

Minor Components

Copenhaver flaggy loam: 0 to 8 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Tiban

Surface layer texture: Channery loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Argillite colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 6.5 inches

Adel

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Colluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

478E—Tiban-Castner channery loams, 15 to 45 percent slopes

Setting

Landform:

- Tiban—Hills, north aspects
- Castner—Hills, south aspects

Slope:

- Tiban—15 to 45 percent
- Castner—15 to 45 percent

Elevation: 4,600 to 6,750 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Tiban and similar soils: 70 percent
 Castner and similar soils: 20 percent

Minor Components

Timberlin stony loam: 0 to 5 percent
 Soils with slopes more than 45 percent: 0 to 3 percent
 Rock outcrop: 0 to 2 percent

Major Component Description

Tiban

Surface layer texture: Channery loam
Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Argillite colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.5 inches

Castner

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

478G—Tiban-Castner channery loams, 45 to 70 percent slopes

Setting

Landform:

- Tiban—Hills, north aspects
- Castner—Hills, south aspects

Slope:

- Tiban—45 to 70 percent
- Castner—45 to 70 percent

Elevation: 4,300 to 6,700 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Tiban and similar soils: 55 percent

Castner and similar soils: 30 percent

Minor Components

Timberlin flaggy loam: 0 to 8 percent

Soils with slopes less than 45 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Tiban

Surface layer texture: Channery loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Argillite colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.5 inches

Castner

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Timberlin Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Mountains and hills

Parent material: Interbedded sandstone and shale residuum

Slope range: 15 to 60 percent

Elevation range: 4,800 to 7,900 feet

Annual precipitation: 17 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, mixed, superactive Ustollic Haplocryalfs

Typical Pedon

Timberlin very flaggy loam, in an area of Bangtail-Timberlin, stony complex, moist, 15 to 45 percent slopes, in an area of forest land, 1,400 feet south and 300 feet east of the northwest corner of sec. 11, T. 1 N., R. 7 E.

Oi—0 to 1 inch; slightly decomposed leaves, needles, and twigs.

A—1 to 6 inches; grayish brown (10YR 5/2) flaggy loam, very dark gray (10YR 3/1) moist; moderate medium granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine, common medium, and few coarse roots; 20 percent flagstones and 15 percent channers; neutral; clear smooth boundary.

Bt1—6 to 11 inches; brown (10YR 5/3) very flaggy clay loam, brown (10YR 4/3) moist; moderate fine

subangular blocky structure; slightly hard, very friable, moderately sticky, and moderately plastic; common very fine and fine and few medium and coarse roots; common distinct clay films on faces of peds and lining pores; 30 percent flagstones and 15 percent channers; neutral; clear smooth boundary.

Bt2—11 to 25 inches; brown (10YR 5/3) very flaggy clay loam; brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, very sticky, and very plastic; common very fine and few fine and medium roots; common distinct clay films on faces of peds and lining pores; 30 percent flagstones and 15 percent channers; slightly acid; clear wavy boundary.

Cr—25 to 30 inches; pale brown (10YR 6/3) semiconsolidated shale that textures to clay loam; slightly acid.

R—30 inches; olive (5Y 5/3) hard sandstone.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the R horizon: 20 to 40 inches

Note: The A horizon does not meet the thickness requirements for a mollic epipedon.

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1 or 2

Clay content: 18 to 27 percent

Content of rock fragments: 5 to 35 percent—0 to 3 percent stones; 0 to 20 percent flagstones or angular cobbles; 5 to 15 percent channers or angular pebbles

Reaction: pH 6.6 to 7.3

Note: Some pedons contain an E horizon below the A horizon.

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Sandy clay loam or clay loam

Clay content: 25 to 35 percent

Content of rock fragments: 35 to 60 percent—20 to 35 percent flagstones or angular cobbles; 15 to 25 percent channers or angular pebbles

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Sandy clay loam or clay loam

Clay content: 25 to 35 percent
 Content of rock fragments: 35 to 70 percent—20
 to 40 percent flagstones or angular cobbles; 15
 to 30 percent channers or angular pebbles
 Reaction: pH 6.1 to 7.3

694F—Timberlin-Copenhaver complex, 35 to 60 percent slopes

Setting

Landform:

- Timberlin—Mountains
- Copenhaver—Mountains

Slope:

- Timberlin—35 to 60 percent
- Copenhaver—35 to 60 percent

Elevation: 5,000 to 7,900 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Timberlin and similar soils: 65 percent

Copenhaver and similar soils: 25 percent

Minor Components

Bangtail loam, moist: 0 to 7 percent

Rock outcrop: 0 to 3 percent

Major Component Description

Timberlin

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.3 inches

Copenhaver

Surface layer texture: Flaggy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Tolbert Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Hills and sedimentary plains

Parent material: Interbedded sandstone and shale residuum, igneous residuum, sandstone residuum, or argillite residuum

Slope range: 2 to 70 percent

Elevation range: 4,250 to 7,100 feet

Annual precipitation: 10 to 22 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 80 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Lithic Argiustolls

Typical Pedon

Tolbert cobbly loam, in an area of Tolbert, stony-Rock outcrop complex, 8 to 15 percent slopes, in an area of rangeland, 200 feet north and 3,300 feet east of the southwest corner of sec. 8, T. 1 S., R. 1 E.

A—0 to 4 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent angular cobbles and 15 percent angular pebbles; neutral; clear wavy boundary.

Bt1—4 to 10 inches; brown (10YR 4/3) very cobbly clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; few faint clay films on faces of peds and rock fragments; 35 percent angular cobbles and 25 percent angular pebbles; slightly alkaline; gradual wavy boundary.

Bt2—10 to 16 inches; yellowish brown (10YR 5/4) very cobbly clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; few very fine roots; few faint clay films on faces of peds and rock fragments; 5 percent stones, 35 percent angular cobbles, and 20 percent angular pebbles; slightly alkaline; clear wavy boundary.

R—16 inches; hard, fractured volcanic rock.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 16 inches

Depth to bedrock: 10 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 15 to 70 percent—0 to 10 percent stones; 10 to 25 percent cobbles; 5 to 45 percent pebbles

Reaction: pH 6.6 to 7.4

Bt horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy clay loam, or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 75 percent—0 to 5 percent stones; 20 to 40 percent cobbles; 15 to 30 percent pebbles

Reaction: pH 6.6 to 7.8

339E—Tolbert cobbly loam, 8 to 35 percent slopes, very stony

Setting

Landform: Hills

Slope: 8 to 35 percent

Elevation: 5,000 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Tolbert and similar soils: 90 percent

Minor Components

Reedwest loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 4 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

739E—Tolbert, stony-Rock outcrop complex, 15 to 60 percent slopes

Setting

Landform:

- Tolbert—Hills
- Rock outcrop—Hills

Slope: 15 to 60 percent

Elevation: 4,500 to 6,200 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Tolbert and similar soils: 65 percent

Rock outcrop: 20 percent

Minor Components

Anceney stony loam: 0 to 5 percent

Blaincreek channery loam: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 5 percent

Major Component Description

Tolbert

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.8 inches

Rock outcrop

Definition: Exposures of argillite bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

739D—Tolbert, stony-Rock outcrop complex, 8 to 15 percent slopes**Setting***Landform:*

- Tolbert—Hills
- Rock outcrop—Hills

Slope: 8 to 15 percent*Elevation:* 4,800 to 5,900 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Tolbert and similar soils: 65 percent

Rock outcrop: 20 percent

Minor Components

Blaincreek channery loam: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description**Tolbert***Surface layer texture:* Cobbly loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.8 inches**Rock outcrop***Definition:* Exposures of argillite bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

239E—Tolbert, stony-Rock outcrop complex, 8 to 45 percent slopes**Setting***Landform:* Hills*Slope:* 8 to 45 percent*Elevation:* 4,250 to 5,300 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Tolbert and similar soils: 65 percent

Rock outcrop: 20 percent

Minor Components

Anceney cobbly loam: 0 to 5 percent

Blaincreek loam: 0 to 5 percent

Reedpoint less than 10 inches deep to bedrock: 0 to 5 percent

Major Component Description**Tolbert***Surface layer texture:* Cobbly loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Igneous residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.8 inches**Rock outcrop***Definition:* Exposures of extrusive igneous rock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

870D—Tolbert-Absarook-Rock outcrop complex, 4 to 15 percent slopes**Setting***Landform:*

- Tolbert—Hills
- Absarook—Hills
- Rock outcrop—Hills

Slope:

- Tolbert—4 to 15 percent
- Absarook—4 to 15 percent

Elevation: 5,500 to 6,500 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Tolbert and similar soils: 50 percent

Absarook and similar soils: 30 percent

Rock outcrop: 10 percent

Minor Components

Farnuf loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description**Tolbert**

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

Absarook

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.3 inches

Rock outcrop

Definition: Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

870E—Tolbert-Absarook-Rock outcrop complex, 15 to 35 percent slopes**Setting**

Landform:

- Tolbert—Hills
- Absarook—Hills
- Rock outcrop—Hills

Slope:

- Tolbert—15 to 35 percent
- Absarook—15 to 35 percent

Elevation: 4,400 to 6,450 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition**Major Components**

Tolbert and similar soils: 45 percent

Absarook and similar soils: 30 percent

Rock outcrop: 15 percent

Minor Components

Farnuf loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 5 percent

Major Component Description**Tolbert**

Surface layer texture: Channery loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.9 inches

Absarook

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.3 inches

Rock outcrop

Definition: Exposures of sandstone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

439D—Tolbert-Blaincreek complex, 2 to 15 percent slopes**Setting**

Landform:

- Tolbert—Hills
- Blaincreek—Hills

Slope:

- Tolbert—2 to 15 percent
- Blaincreek—2 to 15 percent

Elevation: 5,450 to 6,600 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Tolbert and similar soils: 55 percent

Blaincreek and similar soils: 30 percent

Minor Components

Shawmut gravelly loam: 0 to 8 percent

Bowery loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Tolbert***Surface layer texture:* Channery loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.9 inches**Blaincreek***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 2.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

439E—Tolbert-Blaincreek-Adel complex, 15 to 45 percent slopes

Setting*Landform:*

- Tolbert—Hills
- Blaincreek—Hills
- Adel—Hills

Slope:

- Tolbert—15 to 45 percent
- Blaincreek—15 to 45 percent
- Adel—15 to 45 percent

Elevation: 4,400 to 6,500 feet*Mean annual precipitation:* 17 to 22 inches*Frost-free period:* 65 to 100 days**Composition****Major Components**

Tolbert and similar soils: 35 percent

Blaincreek and similar soils: 30 percent

Adel and similar soils: 20 percent

Minor Components

Tolex and similar soils: 0 to 8 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Tolbert***Surface layer texture:* Channery loam*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.9 inches**Blaincreek***Surface layer texture:* Loam*Depth class:* Moderately deep (20 to 40 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 2.5 inches**Adel***Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 9.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Tolex Series*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Permeability:* Moderately slow*Landform:* Hills*Parent material:* Argillite residuum*Slope range:* 15 to 70 percent*Elevation range:* 4,200 to 6,700 feet*Annual precipitation:* 15 to 19 inches*Annual air temperature:* 39 to 43 degrees F*Frost-free period:* 90 to 110 days**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Haplustalfs**Typical Pedon**

Tolex very channery coarse sandy loam, 45 to 70 percent slopes, in an area of rangeland, 2,000 feet south and 300 feet east of the northwest corner of sec. 31, T. 4 N., R. 4 E.

E—0 to 4 inches; brown (10YR 5/3) very channery coarse sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky, and nonplastic; common very fine and fine and few medium roots; 5 percent flagstones and 40 percent channers; neutral; clear smooth boundary.

Bt—4 to 15 inches; light yellowish brown (10YR 6/4) extremely channery clay loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, moderately sticky, and moderately plastic; few faint clay films on faces of peds and coarse fragments; few very fine and medium roots; 15 percent flagstones and 55 percent channers; slightly alkaline; clear wavy boundary.

R—15 inches; hard platy argillite.

Range in Characteristics*Soil temperature:* 44 to 47 degrees F*Moisture control section:* Between 4 and 12 inches*Depth to bedrock:* 10 to 20 inches**E horizon**

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Clay content: 10 to 20 percent

Content of rock fragments: 35 to 60 percent—5 to 10 percent cobbles or flagstones; 30 to 50 percent pebbles or channers

Reaction: pH 6.6 to 7.3

Bt horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Texture: Clay loam, sandy clay loam, or sandy loam

Clay content: 18 to 35 percent

Content of rock fragments: 50 to 75 percent—10 to 15 percent cobbles or flagstones; 40 to 60 percent pebbles or channers

Reaction: pH 6.6 to 7.8

812E—Tolex very channery coarse sandy loam, 15 to 45 percent slopes**Setting***Landform:* Hills*Slope:* 15 to 45 percent*Elevation:* 4,750 to 6,400 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days**Composition****Major Components**

Tolex and similar soils: 85 percent

Minor Components

Soils more than 20 inches deep to bedrock: 0 to 10 percent

Rock outcrop: 0 to 5 percent

Major Component Description*Depth class:* Shallow (10 to 20 inches)*Drainage class:* Well drained*Dominant parent material:* Argillite residuum*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

812G—Tolex very channery coarse sandy loam, 45 to 70 percent slopes**Setting***Landform:* Hills*Slope:* 45 to 70 percent*Elevation:* 4,200 to 6,350 feet*Mean annual precipitation:* 15 to 19 inches*Frost-free period:* 90 to 110 days

Composition

Major Components

Tolex and similar soils: 90 percent

Minor Components

Soils more than 20 inches deep to bedrock: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

912E—Tolex very channery coarse sandy loam, moist, 15 to 45 percent slopes

Setting

Landform: Hills

Slope: 15 to 45 percent

Elevation: 4,700 to 6,450 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Tolex and similar soils: 90 percent

Minor Components

Soils more than 20 inches deep to bedrock: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

912G—Tolex very channery coarse sandy loam, moist, 45 to 70 percent slopes

Setting

Landform: Hills

Slope: 45 to 70 percent

Elevation: 4,400 to 6,700 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Tolex and similar soils: 90 percent

Minor Components

Soils more than 20 inches deep to bedrock: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Toston Series

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Permeability: Slow

Landform: Stream terraces

Parent material: Alluvium

Slope range: 0 to 2 percent

Elevation range: 3,950 to 4,350 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 43 to 45 degrees F

Frost-free period: 95 to 120 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Natrustalfs

Typical Pedon

Toston loam, 0 to 2 percent slopes, in an area of rangeland, 800 feet south and 700 feet east of the northwest corner of sec. 7, T. 3 N., R. 3 E.

A—0 to 3 inches; gray (10YR 3/2) loam, very dark grayish brown (10YR 6/1) dry; weak medium platy structure; slightly hard, friable, slightly sticky, and slightly plastic; many very fine and few medium roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

Bt_{ny}—3 to 8 inches; dark gray (10YR 3/1) silty clay, very dark gray (10YR 5/1) dry; moderate coarse prismatic structure parting to strong fine angular blocky; very hard, very friable, very sticky, and very plastic; many very fine and few medium roots; common distinct clay films on faces of peds; few fine masses of gypsum; strongly alkaline; clear smooth boundary.

Bk_{nyz}1—8 to 20 inches; light brownish gray (10YR 4/2) silty clay loam, dark grayish brown (10YR 6/2) dry; moderate coarse prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky, and very plastic; many very fine and few medium roots; few fine masses of gypsum and other salts; many fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bk_{nyz}2—20 to 24 inches; light brownish gray (10YR 4/2) silty clay loam, dark grayish brown (10YR 6/2) dry; few fine and medium faint dark yellowish brown (10YR 3/4) redox concentrations; moderate coarse prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky, and very plastic; few very fine and fine roots; few fine masses of gypsum and other salts; many fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bk_{nyz}3—24 to 32 inches; gray (10YR 3/1) silty clay loam, very dark gray (10YR 5/1) dry; few fine and medium distinct dark yellowish brown (10YR 4/4) redox concentrations; moderate coarse prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky, and very plastic; few very fine and fine roots; few fine masses of gypsum and other salts; many fine masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bk_{nyz}4—32 to 40 inches; light brownish gray (2.5Y 4/2) silty clay loam, dark grayish brown (2.5Y 6/2) dry; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; weak fine subangular blocky structure; very hard, very firm, very sticky, and very plastic; few very fine roots; few fine masses of gypsum and other salts; many fine

masses of lime; violently effervescent; very strongly alkaline; clear smooth boundary.

C_n—40 to 60 inches; light brownish gray (2.5Y 4/2) sandy clay loam with strata of clay loam and loamy sand, dark grayish brown (2.5Y 6/2) dry; few fine distinct dark yellowish brown (10YR 4/4) redox concentrations; massive; hard, firm, moderately sticky, and moderately plastic; violently effervescent; very strongly alkaline.

Range in Characteristics

Soil temperature: 45 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Depth to seasonal high water table: 24 to 42 inches

Depth to the B_{kn} horizon: 6 to 20 inches

A horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 20 to 27 percent

Electrical conductivity (mmhos/cm): 2 to 8

Sodium adsorption ratio: 0 to 8

Reaction: pH 7.9 to 9.0

Note: Cultivated areas have an Ap horizon of silty clay loam or silty clay.

B_{t_{ny}} horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Texture: Silty clay or silty clay loam

Clay content: 35 to 45 percent

Electrical conductivity (mmhos/cm): 4 to 8

Sodium adsorption ratio: 13 to 30

Reaction: pH 8.5 to 9.6

B_{k_{nyz}} horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Clay content: 27 to 35 percent

Electrical conductivity (mmhos/cm): 8 to 16

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 8.5 to 9.5

C_n horizon

Hue: 10YR or 2.5Y

Value: 6 or 7 dry; 3, 4, or 5 moist

Chroma: 1, 2, or 3

Texture: Stratified clay loam to loamy sand

Clay content: 10 to 30 percent

Electrical conductivity (mmhos/cm): 8 to 16

Sodium adsorption ratio: 13 to 30

Calcium carbonate equivalent: 2 to 15 percent

Reaction: pH 7.9 to 9.6

502A—Toston loam, 0 to 2 percent slopes**Setting***Landform:* Stream terraces*Slope:* 0 to 2 percent*Elevation:* 3,950 to 4,250 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 120 days**Composition****Major Components**

Toston and similar soils: 85 percent

Minor Components

Ryell sandy loam: 0 to 8 percent

Alona silt loam: 0 to 5 percent

Bonebasin loam: 0 to 2 percent

Major Component Description*Surface layer texture:* Loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Somewhat poorly drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Water table:* Apparent*Salt affected:* Saline within 30 inches*Sodium affected:* Sodic within 30 inches*Available water capacity:* Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Trimad Series*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Permeability:* Moderate*Landform:* Relict stream terraces, escarpments, alluvial fans, and stream terraces*Parent material:* Alluvium or colluvium*Slope range:* 0 to 60 percent*Elevation range:* 4,000 to 5,700 feet*Annual precipitation:* 10 to 16 inches*Annual air temperature:* 41 to 45 degrees F*Frost-free period:* 90 to 115 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Aridic Calciustolls

Typical Pedon

Trimad cobbly loam, 0 to 4 percent slopes, in an area of cropland, 900 feet north and 300 feet west of the southeast corner of sec. 3, T. 2 S., R. 1 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent cobbles and 10 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk1—5 to 19 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine roots; 5 percent cobbles and 10 percent pebbles; common distinct lime coatings on coarse fragments; disseminated lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—19 to 25 inches; light gray (10YR 7/2) very cobbly sandy loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, and nonplastic; few very fine roots; 20 percent cobbles and 25 percent pebbles; common distinct lime coatings on coarse fragments; disseminated lime; violently effervescent; moderately alkaline; clear wavy boundary.

Bk3—25 to 60 inches; white (10YR 8/2) very gravelly sandy loam, light brownish gray (10YR 6/2) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and nonplastic; 15 percent cobbles and 30 percent pebbles; common distinct lime coatings on coarse fragments; few prominent lime casts on coarse fragments; disseminated lime; violently effervescent; moderately alkaline.

Range in Characteristics*Soil temperature:* 43 to 47 degrees F*Moisture control section:* Between 8 and 24 inches*Mollic epipedon thickness:* 7 to 10 inches*Depth to the Bk horizon:* 4 to 7 inches**Ap horizon**

Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture: Loam or sandy loam

Clay content: 10 to 27 percent

Content of rock fragments: 5 to 35 percent—5 to 15 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 6.6 to 7.8

Note: Uncultivated areas may contain a Bw horizon.

Bk1 horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 5 or 6 moist
 Chroma: 2 or 3
 Texture: Loam or sandy loam
 Clay content: 10 to 27 percent
 Content of rock fragments: 15 to 50 percent—5 to 20 percent cobbles; 10 to 30 percent pebbles
 Calcium carbonate equivalent: 10 to 15 percent
 Reaction: pH 7.4 to 8.4

Bk2 horizon

Hue: 10YR or 2.5Y
 Value: 6 or 7 dry; 5 or 6 moist
 Chroma: 2 or 3
 Texture: Loam or sandy loam
 Clay content: 10 to 15 percent
 Content of rock fragments: 35 to 70 percent—10 to 20 percent cobbles; 25 to 50 percent pebbles
 Calcium carbonate equivalent: 15 to 25 percent
 Reaction: pH 7.4 to 8.4

Bk3 horizon

Hue: 10YR or 2.5Y
 Value: 6, 7, or 8 dry; 5 or 6 moist
 Chroma: 2 or 3
 Clay content: 10 to 15 percent
 Content of rock fragments: 35 to 70 percent—10 to 20 percent cobbles; 25 to 50 percent pebbles
 Calcium carbonate equivalent: 10 to 25 percent
 Reaction: pH 7.4 to 8.4

**242B—Trimad cobbly loam,
0 to 4 percent slopes**

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Elevation: 4,300 to 5,250 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Trimad and similar soils: 85 percent

Minor Components

Binna loam: 0 to 5 percent
 Scravo cobbly sandy loam: 0 to 5 percent
 Trimad very cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**242C—Trimad cobbly loam,
4 to 8 percent slopes**

Setting

Landform: Relict stream terraces
Slope: 4 to 8 percent
Elevation: 4,050 to 5,000 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Trimad and similar soils: 85 percent

Minor Components

Binna loam: 0 to 5 percent
 Scravo cobbly sandy loam: 0 to 5 percent
 Trimad very cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**242D—Trimad cobbly loam,
8 to 15 percent slopes****Setting***Landform:* Relict stream terraces*Slope:* 8 to 15 percent*Elevation:* 4,250 to 5,350 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Trimad and similar soils: 85 percent

Minor Components

Binna loam: 0 to 5 percent

Scravo cobbly sandy loam: 0 to 5 percent

Trimad very cobbly loam: 0 to 5 percent

Major Component Description*Surface layer texture:* Cobbly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**242E—Trimad cobbly loam,
15 to 35 percent slopes****Setting***Landform:* Escarpments*Slope:* 15 to 35 percent*Elevation:* 4,050 to 5,500 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Trimad and similar soils: 85 percent

Minor Components

Amesha loam: 0 to 5 percent

Scravo cobbly sandy loam: 0 to 5 percent

Soils with slopes more than 35 percent: 0 to 3 percent

Cabbart loam: 0 to 2 percent

Major Component Description*Surface layer texture:* Cobbly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium*Native plant cover type:* Rangeland*Flooding:* None*Available water capacity:* Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**742F—Trimad cobbly loam, moist,
35 to 60 percent slopes****Setting***Landform:* Escarpments*Slope:* 35 to 60 percent*Elevation:* 4,100 to 5,250 feet*Mean annual precipitation:* 10 to 14 inches*Frost-free period:* 95 to 115 days**Composition****Major Components**

Trimad and similar soils: 85 percent

Minor Components

Cabbart loam: 0 to 5 percent

Kalsted sandy loam: 0 to 5 percent

Quigley loam: 0 to 5 percent

Major Component Description*Surface layer texture:* Cobbly loam*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium or colluvium*Native plant cover type:* Forest land*Flooding:* None*Available water capacity:* Mainly 4.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

42B—Trimad loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces
Slope: 0 to 4 percent
Elevation: 4,000 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Trimad and similar soils: 85 percent

Minor Components

Crago cobbly loam: 0 to 5 percent
 Musselshell loam: 0 to 5 percent
 Trimad cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

442B—Trimad loam, calcareous surface, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 4 percent
Elevation: 4,200 to 4,400 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Trimad and similar soils: 85 percent

Minor Components

Musselshell loam: 0 to 5 percent
 Scravo cobbly sandy loam: 0 to 5 percent
 Trimad cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 4.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Turner Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate above the 2C horizon and rapid in the 2C horizon
Landform: Stream terraces
Parent material: Alluvium
Slope range: 0 to 4 percent
Elevation range: 4,300 to 5,400 feet
Annual precipitation: 15 to 19 inches
Annual air temperature: 39 to 43 degrees F
Frost-free period: 90 to 110 days

Taxonomic Class: Fine-loamy over sandy or sandy skeletal, mixed, superactive, frigid Typic Argiustolls

Typical Pedon

Turner loam, 0 to 4 percent slopes, in an area of cropland, 1,900 feet south and 350 feet west of the northeast corner of sec. 17, T. 1 N., R. 5 E.

Ap—0 to 6 inches; brown (10YR 4/3) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, very friable, moderately sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent pebbles; neutral; abrupt smooth boundary.

Bt—6 to 12 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, friable, moderately

sticky, and moderately plastic; many very fine and common fine roots; 5 percent pebbles; slightly alkaline; abrupt smooth boundary.

Bk1—12 to 18 inches; light yellowish brown (10YR 6/4) clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak fine subangular blocky; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine roots; 2 percent cobbles and 10 percent pebbles; many medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—18 to 22 inches; light yellowish brown (10YR 6/4) gravelly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; few very fine roots; 5 percent cobbles and 15 percent pebbles; common fine masses of lime; common distinct lime crusts on the underside of coarse fragments; violently effervescent; moderately alkaline; clear smooth boundary.

Bk3—22 to 26 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few very fine roots; 5 percent cobbles and 20 percent pebbles; common faint lime crusts on the underside of rock fragments; violently effervescent; moderately alkaline; clear smooth boundary.

2C—26 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky, and nonplastic; 20 percent cobbles and 50 percent pebbles; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 15 inches

Depth to the Bk horizon: 11 to 20 inches

Depth to the 2C horizon: 20 to 40 inches

A horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 15 to 27 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizon

Hue: 7.5YR, 10YR, or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 2 or 3

Texture: Silty clay loam, clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 7.5YR, 10YR, or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Loam, clay loam, or sandy loam

Clay content: 18 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 5 percent cobbles; 0 to 25 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

2C horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loamy sand or sand

Clay content: 0 to 5 percent

Content of rock fragments: 35 to 80 percent—5 to 20 percent cobbles; 30 to 60 percent pebbles

Calcium carbonate equivalent: 0 to 10 percent

Reaction: pH 7.4 to 8.4

57B—Turner loam, 0 to 4 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 4 percent

Elevation: 4,350 to 5,400 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Turner and similar soils: 85 percent

Minor Components

Beaverton cobbly loam: 0 to 5 percent

Corbly cobbly sandy loam: 0 to 5 percent

Martinsdale loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

457A—Turner loam, moderately wet, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Slope: 0 to 2 percent

Elevation: 4,300 to 5,200 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Turner and similar soils: 85 percent

Minor Components

Beaverton cobbly loam: 0 to 5 percent

Meadowcreek loam: 0 to 5 percent

Turner loam: 0 to 5 percent

Major Component Description

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Udecide Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Hills, sedimentary plains, and escarpments

Parent material: Semiconsolidated, loamy sedimentary beds

Slope range: 4 to 35 percent

Elevation range: 4,100 to 5,500 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Aridic Argiustolls

Typical Pedon

Udecide cobbly sandy clay loam, in an area of Udecide-Cabbart complex, 15 to 45 percent slopes, in an area of native rangeland, 1,600 feet south and 1,400 feet east of the northwest corner of sec. 20, T. 1 N., R. 1 E.

A—0 to 5 inches; grayish brown (10YR 5/2) cobbly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 10 percent cobbles and 10 percent pebbles; slightly alkaline; clear smooth boundary.

Bt1—5 to 7 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, firm, slightly sticky, and slightly plastic; common very fine and few medium roots; few faint clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bt2—7 to 12 inches; grayish brown (10YR 5/2) sandy clay loam, dark brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky, and moderately plastic; common very fine and fine and few medium roots; many faint clay films on faces of peds; slightly alkaline; clear smooth boundary.

Bk—12 to 32 inches; light gray (2.5Y 7/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common medium masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Cr—32 to 60 inches; weakly consolidated sandstone.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 10 inches

Depth to the Bk horizon: 10 to 22 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Hue: 10YR or 2.5Y
 Value: 2 or 3 moist
 Chroma: 2 or 3
 Texture: Sandy clay loam, clay loam, or silt loam
 Clay content: 20 to 30 percent
 Content of rock fragments: 0 to 35 percent—0 to 20 percent cobbles; 0 to 15 percent pebbles
 Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 7.5YR, 10YR, or 2.5Y
 Value: 4, 5, or 6 dry; 3 or 4 moist
 Chroma: 2 or 3
 Texture: Sandy clay loam or clay loam
 Clay content: 20 to 35 percent
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
 Reaction: pH 6.6 to 7.8

Bk horizon

Hue: 10YR or 2.5Y
 Value: 5, 6, or 7 dry; 4, 5, or 6 moist
 Chroma: 2, 3, or 4
 Texture: Sandy loam or sandy clay loam
 Clay content: 15 to 30 percent
 Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles
 Calcium carbonate equivalent: 10 to 20 percent
 Reaction: pH 7.9 to 8.4

24C—Udecide silt loam, 4 to 8 percent slopes

Setting

Landform: Sedimentary plains
Slope: 4 to 8 percent
Elevation: 5,000 to 5,350 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Udecide and similar soils: 85 percent

Minor Components

Varney sandy clay loam: 0 to 10 percent
 Cabbart loam: 0 to 5 percent

Major Component Description

Surface layer texture: Silt loam
Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

724C—Udecide-Cabbart complex, 4 to 8 percent slopes

Setting

Landform:

- Udecide—Sedimentary plains
- Cabbart—Sedimentary plains

Slope:

- Udecide—4 to 8 percent
- Cabbart—4 to 8 percent

Elevation: 4,600 to 5,400 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Udecide and similar soils: 60 percent
 Cabbart and similar soils: 25 percent

Minor Components

Varney clay loam: 0 to 10 percent
 Headwaters loam: 0 to 5 percent

Major Component Description

Udecide

Surface layer texture: Sandy clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.7 inches

Cabbart

Surface layer texture: Loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

724D—Udecide-Cabbart complex, 8 to 15 percent slopes

Setting

Landform:

- Udecide—Hills
- Cabbart—Hills

Slope:

- Udecide—8 to 15 percent
- Cabbart—8 to 15 percent

Elevation: 4,150 to 5,500 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Udecide and similar soils: 60 percent

Cabbart and similar soils: 25 percent

Minor Components

Varney clay loam: 0 to 10 percent

Tanna clay loam: 0 to 5 percent

Major Component Description

Udecide

Surface layer texture: Sandy clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.7 inches

Cabbart

Surface layer texture: Loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.3 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

724E—Udecide-Cabbart complex, 15 to 45 percent slopes

Setting

Landform:

- Udecide—Escarpments
- Cabbart—Escarpments

Slope:

- Udecide—15 to 35 percent
- Cabbart—30 to 45 percent

Elevation: 4,150 to 5,500 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Udecide and similar soils: 65 percent

Cabbart and similar soils: 20 percent

Minor Components

Varney clay loam: 0 to 8 percent

Amesha loam: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Udecide

Surface layer texture: Cobbly sandy clay loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 4.8 inches

Cabbart

Surface layer texture: Cobbly sandy loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Semiconsolidated, loamy sedimentary beds

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 3.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Uinta Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Mountains

Parent material: Argillite colluvium or interbedded sandstone and shale residuum

Slope range: 8 to 45 percent

Elevation range: 5,450 to 6,700 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-loamy, mixed, superactive
Eutric Glossocryalfs

Typical Pedon

Uinta loam, in an area of Uinta-Paddy complex, cool, 15 to 45 percent slopes, in an area of forest land, 4,100 feet north and 1,200 feet east of the southwest corner of sec. 11, T. 5 N., R. 4 E.

Oi—0 to 1 inch; undecomposed needles, twigs, grass, leaves, plants, and roots.

E—1 to 6 inches; light reddish brown (5YR 6/3) loam, reddish brown (5YR 4/3) moist; moderate very fine and fine granular structure; soft, friable, slightly sticky, and slightly plastic; many fine and common medium roots; many very fine and fine pores; 5 percent cobbles and 5 percent pebbles; slightly acid; clear smooth boundary.

E/Bt—6 to 14 inches; reddish brown (2.5YR 5/4) clay loam, dark reddish brown (2.5YR 3/4) moist; weak fine subangular blocky structure parting to weak fine granular; soft, friable, moderately sticky, and moderately plastic; common fine and medium and few coarse roots; common very fine and fine pores; few faint clay films on faces of peds; 5 percent pebbles; slightly acid; clear smooth boundary.

Bt1—14 to 23 inches; light reddish brown (5YR 6/3) clay loam, reddish brown (2.5YR 4/4) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, firm, moderately sticky, and moderately plastic; few fine, medium, and coarse roots; common fine

pores; many distinct clay films on faces of peds; 5 percent pebbles; slightly acid; gradual smooth boundary.

Bt2—23 to 32 inches; light reddish brown (5YR 6/3) clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, firm, moderately sticky, and moderately plastic; few fine, medium, and coarse roots; common fine pores; many distinct clay films on faces of peds; 5 percent pebbles; slightly acid; gradual smooth boundary.

Bt3—32 to 60 inches; reddish brown (5YR 5/3) clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure; slightly hard, firm, moderately sticky, and moderately plastic; few fine and medium roots; few fine pores; 10 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

E horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 3 or 4

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

E/Bt horizon

Hue: 5YR or 2.5YR

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 3 or 4

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.1 to 7.3

Bt horizons

Hue: 5YR or 2.5YR

Value: 4, 5, or 6 dry; 4 or 5 moist

Chroma: 3 or 4

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Reaction: pH 6.1 to 7.8

Note: The Uinta soil as mapped in Gallatin County is a taxadjunct to the series. It classifies as Fine-loamy, mixed, superactive Ustic Haplocryolls. Use and management is similar.

490E—Uinta-Paddy complex, 15 to 45 percent slopes

Setting

Landform:

- Uinta—Mountains
- Paddy—Mountains

Slope:

- Uinta—15 to 45 percent
- Paddy—15 to 45 percent

Elevation: 5,450 to 6,550 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Uinta and similar soils: 50 percent

Paddy and similar soils: 40 percent

Minor Components

Uinta very stony loam: 0 to 5 percent

Soils less than 10 inches deep to bedrock: 0 to 4 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Uinta

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Argillite colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 9.1 inches

Paddy

Surface layer texture: Clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

390E—Uinta-Paddy complex, cool, 15 to 45 percent slopes

Setting

Landform:

- Uinta—Mountains
- Paddy—Mountains

Slope:

- Uinta—15 to 45 percent
- Paddy—15 to 45 percent

Elevation: 5,800 to 6,650 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Uinta and similar soils: 50 percent

Paddy and similar soils: 40 percent

Minor Components

Uinta stony loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Uinta

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Argillite colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 9.1 inches

Paddy

Surface layer texture: Clay loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Argillite residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

UL—Urban land**Composition****Major Components**

Urban land: 100 percent

Major Component Description

Definition: Urban, built-up areas, mostly covered with asphalt, concrete, and buildings.

Varney Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Relict stream terraces and alluvial fans

Parent material: Alluvium

Slope range: 0 to 15 percent

Elevation range: 3,950 to 5,300 feet

Annual precipitation: 10 to 14 inches

Annual air temperature: 41 to 45 degrees F

Frost-free period: 95 to 115 days

Taxonomic Class: Fine-loamy, mixed, superactive, frigid Calcic Argiustolls

Typical Pedon

Varney clay loam, 0 to 4 percent slopes, in an area of cropland, 2,200 feet south and 300 feet east of the northwest corner of sec. 32, T. 1 N., R. 1 E.

Ap—0 to 4 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine angular blocky structure; hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; slightly alkaline; clear smooth boundary.

Bt1—4 to 10 inches; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; strong medium prismatic structure parting to strong medium angular blocky; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds; slightly alkaline; clear irregular boundary.

Bt2—10 to 16 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 4/3) moist; strong medium angular blocky structure; hard, friable, moderately sticky, and moderately plastic; common very fine and fine roots; common distinct

clay films on faces of peds; slightly alkaline; clear wavy boundary.

Bk1—16 to 24 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; soft, very friable, moderately sticky, and slightly plastic; common fine roots; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—24 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, and slightly plastic; few fine roots; few fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 43 to 47 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 10 inches

Depth to the Bk horizon: 10 to 20 inches

Ap horizon

Hue: 10YR or 2.5Y

Value: 2 or 3 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 30 percent—0 to 15 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizons

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam or sandy clay loam

Clay content: 27 to 35 percent

Content of rock fragments: 0 to 35 percent—0 to 15 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 10YR or 2.5Y

Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: Loam, sandy loam, sandy clay loam, or clay loam

Clay content: 10 to 30 percent

Content of rock fragments: 0 to 35 percent—0 to 5 percent cobbles; 0 to 30 percent pebbles

Calcium carbonate equivalent: 10 to 30 percent
Reaction: pH 7.4 to 8.4

44B—Varney clay loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 0 to 4 percent
Elevation: 4,100 to 5,200 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Varney and similar soils: 85 percent

Minor Components

Attewan loam: 0 to 5 percent
Sappington loam: 0 to 5 percent
Soils with slopes more than 4 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

44C—Varney clay loam, 4 to 8 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 4 to 8 percent
Elevation: 3,950 to 5,350 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Varney and similar soils: 85 percent

Minor Components

Amesha loam: 0 to 5 percent
Sappington loam: 0 to 5 percent
Soils with slopes more than 8 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

244B—Varney cobbly loam, 0 to 4 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans
Slope: 0 to 4 percent
Elevation: 4,600 to 5,150 feet
Mean annual precipitation: 10 to 14 inches
Frost-free period: 95 to 115 days

Composition

Major Components

Varney and similar soils: 85 percent

Minor Components

Amesha loam: 0 to 5 percent
Sappington cobbly loam: 0 to 5 percent
Varney very cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 7.4 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

44D—Varney sandy clay loam, 8 to 15 percent slopes

Setting

Landform: Relict stream terraces and alluvial fans

Slope: 8 to 15 percent

Elevation: 4,100 to 5,350 feet

Mean annual precipitation: 10 to 14 inches

Frost-free period: 95 to 115 days

Composition

Major Components

Varney and similar soils: 85 percent

Minor Components

Sappington loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Udecide sandy clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Sandy clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 7.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Vision Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Mountains and hills

Parent material: Sandstone colluvium

Slope range: 15 to 60 percent

Elevation range: 4,300 to 6,850 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal, mixed, superactive, frigid Typic Haplustalfs

Typical Pedon

Vision cobbly loam, 15 to 45 percent slopes, very stony, in an area of forest land, 1,300 feet north and 1,800 feet east of the southwest corner of sec. 33, T. 5 N., R. 4 E.

A—0 to 7 inches; grayish brown (10YR 5/2) cobbly loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium roots; 5 percent stones, 10 percent cobbles, and 5 percent pebbles; neutral; clear wavy boundary.

Bt1—7 to 13 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, very friable, moderately sticky, and slightly plastic; many very fine, common fine, and few medium roots; common distinct clay films on faces of peds; 5 percent stones, 10 percent cobbles, and 20 percent pebbles; slightly acid; clear smooth boundary.

Bt2—13 to 24 inches; pale brown (10YR 6/3) very gravelly clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; common very fine and few fine and medium roots; common distinct clay films on faces of peds; 5 percent stones, 15 percent cobbles, and 30 percent pebbles; slightly acid; clear wavy boundary.

Bt3—24 to 60 inches; pale brown (10YR 6/3) extremely stony clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; common distinct clay films on faces of peds; 30 percent stones, 20 percent cobbles, and 25 percent pebbles; slightly acid.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bt horizon: 5 to 12 inches

Note: The dark-colored A horizon is too thin to classify as a mollisol.

A horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 10 to 20 percent

Content of rock fragments: 15 to 50 percent—3 to 5 percent stones; 5 to 10 percent cobbles; 5 to 35 percent pebbles

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 5 or 6 dry; 4 or 5 moist

Chroma: 2 or 3

Texture: Clay loam, loam, or sandy clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 15 to 35 percent—0 to 5 percent stones; 5 to 10 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 6.1 to 7.3

Bt2 and Bt3 horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4 or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, loam, sandy clay loam, or silty clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 35 to 70 percent—0 to 30 percent stones; 5 to 20 percent cobbles; 30 to 50 percent pebbles

Reaction: pH 6.1 to 7.3

**388E—Vision cobbly loam,
15 to 45 percent slopes, very stony**

Setting

Landform: Mountains

Slope: 15 to 45 percent

Elevation: 4,400 to 6,800 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Vision and similar soils: 85 percent

Minor Components

Tolbert very stony loam: 0 to 10 percent

Rubble land: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**839F—Vision, very stony-Tolbert,
very stony-Rubble land complex,
35 to 60 percent slopes**

Setting

Landform:

- Vision—Hills
- Tolbert—Hills
- Rubble land—Hills

Slope:

- Vision—35 to 60 percent
- Tolbert—35 to 60 percent

Elevation: 4,300 to 6,850 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Vision and similar soils: 40 percent

Tolbert and similar soils: 30 percent

Rubble land: 20 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 7 percent

Rock outcrop: 0 to 3 percent

Major Component Description

Vision

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Sandstone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 5.1 inches

Tolbert

Surface layer texture: Cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Sandstone residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.8 inches

Rubble land

Definition: Areas with more than 90 percent of the surface covered by boulders or stones.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

W—Water**Composition****Major Components**

Water: 100 percent

Major Component Description

Definition: Areas of open water.

Whitecow Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Mountains

Parent material: Limestone colluvium

Slope range: 35 to 60 percent

Elevation range: 4,500 to 7,000 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal, carbonatic, frigid
Typic Calciustepts

Typical Pedon

Whitecow cobbly loam, in an area of Whitecow, stony-Lap, very stony-Rock outcrop complex, 35 to 60 percent slopes, in an area of forest land, 1,850 feet south and 2,900 feet west of the northeast corner of sec. 21, T. 5 N., R. 4 E.

Oi—0 to 2 inches; undecomposed forest litter.

A—2 to 6 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine roots; common very fine pores; 10 percent cobbles and 10 percent pebbles; slightly alkaline; abrupt smooth boundary.

AB—6 to 12 inches; brown (10YR 5/3) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common very fine and few medium and coarse roots; common very fine and fine pores; 10 percent stones and 30 percent pebbles; strongly effervescent; slightly alkaline; clear smooth boundary.

Bk1—12 to 22 inches; pale brown (10YR 6/3) very gravelly loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common very fine and fine pores; 10 percent stones and 40 percent pebbles; violently effervescent; slightly alkaline; gradual smooth boundary.

Bk2—22 to 32 inches; very pale brown (10YR 7/3) very gravelly loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few fine roots; common fine pores; 10 percent stones and 35 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk3—32 to 60 inches; light gray (10YR 7/2) very gravelly loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky, and nonplastic; common fine and medium pores; 15 percent stones and 35 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 4 to 25 inches

A and AB horizons

Value: 4, 5, or 6 dry; 3 or 4 moist

Chroma: 2 or 3

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 45 percent—5 to 15 percent stones and cobbles; 10 to 30 percent pebbles

Calcium carbonate equivalent: 0 to 5 percent

Reaction: pH 7.4 to 8.4

Bk horizons

Hue: 10YR and 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 35 to 70 percent—0 to 15 percent stones; 35 to 60 percent pebbles
 Calcium carbonate equivalent: 40 to 50 percent
 Reaction: pH 7.9 to 8.4

86F—Whitecow cobbly loam, 35 to 60 percent slopes, stony

Setting

Landform: Mountains
Slope: 35 to 60 percent
Elevation: 4,600 to 7,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Whitecow and similar soils: 90 percent

Minor Components

Lap very stony loam: 0 to 5 percent
 Rock outcrop: 0 to 3 percent
 Soils with slopes more than 60 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Limestone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 5.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

786F—Whitecow, stony-Lap, very stony-Rock outcrop complex, 35 to 60 percent slopes

Setting

Landform:

- Whitecow—Mountains
- Lap—Mountains
- Rock outcrop—Mountains

Slope:

- Whitecow—35 to 60 percent
- Lap—35 to 60 percent

Elevation: 4,500 to 7,300 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Whitecow and similar soils: 50 percent
 Lap and similar soils: 20 percent
 Rock outcrop: 20 percent

Minor Components

Soils 20 to 40 inches deep to bedrock: 0 to 8 percent
 Rubble land: 0 to 2 percent

Major Component Description

Whitecow

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Limestone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 5.8 inches

Lap

Surface layer texture: Very cobbly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Limestone residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.1 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Whitore Series

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Mountains
Parent material: Limestone colluvium
Slope range: 15 to 70 percent
Elevation range: 4,400 to 8,600 feet
Annual precipitation: 20 to 30 inches
Annual air temperature: 34 to 38 degrees F
Frost-free period: 50 to 70 days

Taxonomic Class: Loamy-skeletal, carbonatic Typic Eutrocrypts

Typical Pedon

Whitore gravelly loam, 35 to 60 percent slopes, stony, in an area of forest land, 1,800 feet south and 200 feet east of the northwest corner of sec. 21, T. 5 N., R. 4 E.

Oi—0 to 1 inch; undecomposed forest litter.

A—1 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2 moist); weak medium subangular blocky structure parting to moderate fine and very fine granular; soft, very friable, slightly sticky, and slightly plastic; common very fine and fine and few medium roots; common very fine pores; 5 percent stones and 20 percent pebbles; slightly alkaline; abrupt smooth boundary.

Bw—3 to 15 inches; light brownish gray (10YR 6/2) very gravelly loam, dark brown (10YR 3/3 moist); moderate fine and very fine granular structure; soft, very friable, slightly sticky, and slightly plastic; common fine and medium roots; common very fine and fine pores; 5 percent cobbles and 40 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

Bk1—15 to 27 inches; light gray (10YR 7/2) very gravelly loam, pale brown (10YR 6/3 moist); weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky, and slightly plastic; common fine and medium roots, some forming horizontal mats; common very fine and fine pores; 10 percent cobbles and 45 percent pebbles; common distinct lime concretions on fragments; violently effervescent; moderately alkaline; gradual smooth boundary.

Bk2—27 to 60 inches; very pale brown (10YR 7/3) very gravelly loam, light yellowish brown (10YR 6/4 moist); weak coarse prismatic structure parting to weak fine granular; slightly hard, friable, slightly sticky, and slightly plastic; few fine and medium roots; common fine pores; 15 percent cobbles and 40 percent pebbles; common distinct lime concretions on fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Bk horizon: 5 to 15 inches

A horizon

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 1, 2, or 3

Texture: Loam or clay loam

Clay content: 18 to 35 percent

Content of rock fragments: 10 to 35 percent—2 to 5 percent stones; 0 to 15 percent cobbles; 10 to 20 percent pebbles

Reaction: pH 6.6 to 7.8

Bw horizon

Value: 5 or 6 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 20 to 30 percent

Content of rock fragments: 15 to 50 percent—5 to 10 percent cobbles; 10 to 40 percent pebbles

Calcium carbonate equivalent: 0 to 15 percent

Reaction: pH 7.4 to 8.4

Bk horizons

Value: 6 or 7 dry; 5 or 6 moist

Chroma: 2, 3, or 4

Texture: Loam or clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 40 to 70 percent—5 to 20 percent cobbles; 35 to 50 percent pebbles

Calcium carbonate equivalent: 40 to 60 percent

Reaction: pH 7.4 to 8.4

291G—Whitore cobbly clay loam, 40 to 70 percent slopes, stony

Setting

Landform: Mountains

Slope: 40 to 70 percent

Elevation: 5,200 to 7,600 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Whitore and similar soils: 90 percent

Minor Components

Sicklesteets stony clay loam: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to 4 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Surface layer texture: Gravelly clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

91F—Whitore gravelly loam, 35 to 60 percent slopes, stony

Setting

Landform: Mountains

Slope: 35 to 60 percent

Elevation: 5,000 to 7,650 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Whitore and similar soils: 85 percent

Minor Components

Rock outcrop: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to 5 percent

Soils with slopes more than 60 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

991F—Whitore-Rock outcrop complex, 35 to 70 percent slopes

Setting

Landform:

- Whitore—Mountains
 - Rock outcrop—Mountains
- Slope:* 35 to 70 percent

Elevation: 4,700 to 8,600 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Whitore and similar soils: 70 percent

Rock outcrop: 20 percent

Minor Components

Accola loam: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to 5 percent

Major Component Description

Whitore

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.8 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

691E—Whitore-Sicklesteets complex, 15 to 40 percent slopes, stony

Setting

Landform:

- Whitore—Mountains
- Sicklesteets—Mountains

Slope:

- Whitore—15 to 40 percent
- Sicklesteets—15 to 40 percent

Elevation: 5,250 to 7,700 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Whitore and similar soils: 50 percent

Sicklesteets and similar soils: 40 percent

Minor Components

Accola loam: 0 to 5 percent

Soils less than 40 inches deep to bedrock: 0 to 5 percent

Major Component Description**Whitore**

Surface layer texture: Gravelly clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.8 inches

Sicklesteets

Surface layer texture: Cobbly clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Dolomite colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

**691F—Whitore-Sicklesteets complex,
40 to 60 percent slopes, stony****Setting**

Landform:

- Whitore—Mountains
- Sicklesteets—Mountains

Slope:

- Whitore—40 to 60 percent
- Sicklesteets—40 to 60 percent

Elevation: 5,150 to 7,100 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition**Major Components**

Whitore and similar soils: 50 percent

Sicklesteets and similar soils: 40 percent

Minor Components

Soils less than 20 inches deep to bedrock: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description**Whitore**

Surface layer texture: Gravelly clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.8 inches

Sicklesteets

Surface layer texture: Cobbly clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Dolomite colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.9 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Wilsall Series

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Permeability: Slow

Landform: Hills and sedimentary plains

Parent material: Interbedded sandstone and shale residuum

Slope range: 2 to 45 percent

Elevation range: 4,400 to 6,800 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 37 to 43 degrees F

Frost-free period: 80 to 110 days

Taxonomic Class: Clayey, smectitic, frigid, shallow
Typic Argiustolls

Typical Pedon

Wilsall clay loam, in an area of Billman-Wilsall clay loams, 8 to 25 percent slopes, in an area of rangeland, 900 feet south and 700 feet east of the northwest corner of sec. 21, T. 1 S., R. 7 E.

A—0 to 3 inches; dark grayish brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, friable, very sticky, and very plastic; many very fine and fine and common medium roots; 5 percent cobbles and 5 percent pebbles; neutral; clear smooth boundary.

Bt—3 to 10 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; very hard, firm, very sticky, and very plastic; common very fine, fine, and medium roots; common distinct clay films on faces of peds and lining pores; 5 percent cobbles and 5 percent pebbles; slightly alkaline; clear wavy boundary.

Cr1—10 to 15 inches; semiconsolidated shale, grayish brown (10YR 5/2) moist; violently effervescent.

Cr2—15 to 60 inches; gray (5Y 5/1) semiconsolidated shale, dark gray (5Y 4/1) moist; violently effervescent.

Range in Characteristics

Soil temperature: 39 to 45 degrees F

Moisture control section: Between 4 and 12 inches or between 4 inches and the paralithic contact

Mollic epipedon thickness: 6 to 12 inches, including all or part of the argillic horizon

Depth to weakly consolidated shale or sandstone: 10 to 20 inches

A horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Clay content: 30 to 40 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.3

Bt horizon

Hue: 5YR, 7.5YR, or 10YR

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, clay, or silty clay

Clay content: 35 to 55 percent

Content of rock fragments: 0 to 10 percent—0 to 5 percent cobbles; 0 to 5 percent pebbles

Reaction: pH 6.6 to 7.8

Windham Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderate

Landform: Alluvial fans, stream terraces, and hills

Parent material: Limestone alluvium or limestone colluvium

Slope range: 0 to 60 percent

Elevation range: 4,150 to 7,100 feet

Annual precipitation: 15 to 22 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Loamy-skeletal, carbonatic, frigid Typic Calciustolls

Typical Pedon

Windham gravelly loam, 8 to 15 percent slopes, in an area of rangeland, 100 feet south and 300 feet west of the northeast corner of sec. 17, T. 3 N., R. 5 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky, and slightly plastic; common very fine and fine roots; 10 percent cobbles and 15 percent pebbles; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk1—6 to 14 inches; light brownish gray (10YR 6/2) gravelly loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine and fine roots; 5 percent cobbles and 15 percent pebbles; disseminated lime, common distinct lime crusts and pendants on rock fragments; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—14 to 60 inches; white (10YR 8/2) extremely cobbly loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; slightly hard, friable, moderately sticky, and slightly plastic; few very fine roots; 30 percent cobbles and 40 percent pebbles; disseminated lime, common distinct lime crusts and pendants on rock fragments; violently effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 7 to 10 inches

Depth to the calcic horizon: 7 to 10 inches

A horizon

Hue: 7.5YR or 10YR

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Content of rock fragments: 15 to 35 percent—5 to 10 percent cobbles; 10 to 25 percent pebbles
 Calcium carbonate equivalent: 5 to 10 percent
 Reaction: pH 7.4 to 8.4

Bk1 horizon

Hue: 7.5YR or 10YR
 Value: 4, 5, or 6 dry; 3, 4, 5, or 6 moist
 Chroma: 2, 3, or 4
 Texture: Loam or clay loam
 Clay content: 18 to 30 percent
 Content of rock fragments: 15 to 60 percent—5 to 20 percent cobbles; 10 to 40 percent pebbles
 Calcium carbonate equivalent: 35 to 60 percent
 Reaction: pH 7.9 to 8.4

Bk2 horizon

Hue: 7.5YR, 10YR, or 2.5Y
 Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist
 Chroma: 2, 3, or 4
 Texture: Loam or sandy loam
 Clay content: 18 to 27 percent
 Content of rock fragments: 35 to 70 percent—5 to 30 percent cobbles; 20 to 40 percent pebbles
 Calcium carbonate equivalent: 40 to 60 percent
 Reaction: pH 7.9 to 8.4

266B—Windham cobbly loam, 0 to 4 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 0 to 4 percent
Elevation: 4,750 to 6,000 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Windham and similar soils: 90 percent

Minor Components

Windham very cobbly loam: 0 to 5 percent
 Beanlake loam: 0 to 3 percent
 Soils with slopes more than 4 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

266D—Windham cobbly loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 8 to 15 percent
Elevation: 4,850 to 5,750 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Windham and similar soils: 90 percent

Minor Components

Windham very cobbly loam: 0 to 5 percent
 Beanlake loam: 0 to 3 percent
 Soils with slopes more than 15 percent: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

366D—Windham cobbly loam, 8 to 15 percent slopes, stony

Setting

Landform: Alluvial fans and stream terraces
Slope: 8 to 15 percent
Elevation: 4,500 to 6,250 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Windham and similar soils: 90 percent

Minor Components

Soils with slopes more than 15 percent: 0 to 5 percent

Windham bouldery loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

366E—Windham cobbly loam, 15 to 35 percent slopes, stony

Setting

Landform: Alluvial fans and stream terraces

Slope: 15 to 35 percent

Elevation: 4,600 to 6,400 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Windham and similar soils: 90 percent

Minor Components

Soils with slopes more than 35 percent: 0 to 5 percent

Windham bouldery loam: 0 to 5 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

466E—Windham cobbly loam, 15 to 45 percent slopes, stony

Setting

Landform: Hills

Slope: 15 to 45 percent

Elevation: 4,550 to 7,000 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Windham and similar soils: 85 percent

Minor Components

Lap stony loam: 0 to 8 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

166C—Windham gravelly loam, 4 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 4 to 8 percent

Elevation: 4,500 to 6,100 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Windham and similar soils: 85 percent

Minor Components

Beanlake loam: 0 to 5 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Windham cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

166D—Windham gravelly loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 8 to 15 percent

Elevation: 4,450 to 5,650 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Windham and similar soils: 85 percent

Minor Components

Beanlake loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Windham cobbly loam: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

866E—Windham, stony-Hanson-Lap, stony complex, 8 to 35 percent slopes

Setting

Landform:

- Windham—Hills
- Hanson—Hills
- Lap—Hills

Slope:

- Windham—8 to 35 percent
- Hanson—8 to 35 percent
- Lap—8 to 35 percent

Elevation: 4,700 to 7,000 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Windham and similar soils: 40 percent

Hanson and similar soils: 35 percent

Lap and similar soils: 15 percent

Minor Components

Soils with slopes more than 35 percent: 0 to 6 percent

Rock outcrop: 0 to 4 percent

Major Component Description

Windham

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 5.2 inches

Hanson

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Limestone colluvium
Native plant cover type: Forest land
Flooding: None
Available water capacity: Mainly 6.8 inches

Lap

Surface layer texture: Cobbly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Limestone residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.7 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

666E—Windham, stony-Lap, very stony complex, 15 to 45 percent slopes

Setting

Landform:

- Windham—Hills
- Lap—Hills

Slope:

- Windham—15 to 45 percent
- Lap—15 to 45 percent

Elevation: 4,400 to 6,900 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Windham and similar soils: 65 percent

Lap and similar soils: 20 percent

Minor Components

Rock outcrop: 0 to 5 percent

Soils 20- to 40-inches deep to bedrock: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Major Component Description

Windham

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Limestone colluvium
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 5.2 inches

Lap

Surface layer texture: Very cobbly loam
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Dominant parent material: Limestone residuum
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 1.1 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

766E—Windham, stony-Lap, very stony-Hanson complex, 15 to 45 percent slopes

Setting

Landform:

- Windham—Hills
- Lap—Hills
- Hanson—Hills

Slope:

- Windham—15 to 45 percent
- Lap—15 to 45 percent
- Hanson—15 to 45 percent

Elevation: 5,650 to 7,100 feet

Mean annual precipitation: 17 to 22 inches

Frost-free period: 65 to 100 days

Composition

Major Components

Windham and similar soils: 45 percent

Lap and similar soils: 25 percent

Hanson and similar soils: 20 percent

Minor Components

Rock outcrop: 0 to 5 percent

Soils with slopes less than 15 percent: 0 to 5 percent

Major Component Description

Windham

Surface layer texture: Cobbly loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Limestone colluvium
Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 5.2 inches

Lap

Surface layer texture: Very cobbly loam

Depth class: Shallow (10 to 20 inches)

Drainage class: Well drained

Dominant parent material: Limestone residuum

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 1.1 inches

Hanson

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 5.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

966E—Windham, stony-Rock outcrop complex, 15 to 45 percent slopes

Setting

Landform:

- Windham—Hills
- Rock outcrop—Hills

Slope: 15 to 45 percent

Elevation: 5,150 to 6,800 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Windham and similar soils: 65 percent

Rock outcrop: 20 percent

Minor Components

Lap very stony loam: 0 to 10 percent

Hanson loam, moist: 0 to 5 percent

Major Component Description

Windham

Surface layer texture: Cobbly loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Limestone colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 5.2 inches

Rock outcrop

Definition: Exposures of limestone bedrock.

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Work Series

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Hills, alluvial fans, and stream terraces

Parent material: Alluvium or colluvium

Slope range: 4 to 35 percent

Elevation range: 4,500 to 6,150 feet

Annual precipitation: 15 to 19 inches

Annual air temperature: 39 to 43 degrees F

Frost-free period: 90 to 110 days

Taxonomic Class: Fine, smectitic, frigid Typic Argiustolls

Typical Pedon

Work clay loam, 8 to 15 percent slopes, in an area of hayland, 800 feet south and 1,000 feet east of the northwest corner of sec. 12, T. 3 N., R. 4 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) clay loam; very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky structure parting to moderate fine granular; hard, very firm, moderately sticky, and moderately plastic; common fine and few medium roots; 10 percent pebbles; neutral; abrupt smooth boundary.

Bt1—5 to 9 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, moderately sticky, and moderately plastic; many distinct clay films on faces of peds and lining pores; common very fine and few fine roots; 10 percent pebbles; neutral; abrupt smooth boundary.

Bt2—9 to 13 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; hard, very firm, moderately sticky, and moderately plastic; common distinct clay films on faces of peds; common very fine roots; 5 percent pebbles; neutral; clear wavy boundary.

Bk1—13 to 30 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; slightly hard, friable, moderately sticky, and moderately plastic; few very fine and fine roots; 5 percent pebbles; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2—30 to 38 inches; light brownish gray (10YR 6/2) gravelly clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; 5 percent cobbles and 15 percent pebbles; common fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk3—38 to 60 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, and slightly plastic; few very fine roots; 5 percent pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil temperature: 41 to 45 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 16 inches

Depth to the Bk horizon: 12 to 30 inches

Ap horizon

Value: 4 or 5 dry; 2 or 3 moist

Chroma: 2 or 3

Texture: Clay loam or sandy clay loam

Clay content: 20 to 35 percent

Content of rock fragments: 5 to 35 percent—0 to 5 percent stones; 0 to 10 percent cobbles; 5 to 25 percent pebbles

Reaction: pH 6.6 to 7.8

Bt horizons

Value: 4 or 5 dry; 2, 3, or 4 moist

Chroma: 2 or 3

Texture: Clay loam or clay

Clay content: 35 to 50 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles; 0 to 10 percent pebbles

Reaction: pH 6.6 to 7.8

Bk horizons

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: Clay loam or loam

Clay content: 20 to 35 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent cobbles; 0 to 15 percent pebbles

Calcium carbonate equivalent: 5 to 15 percent

Reaction: pH 7.4 to 8.4

46C—Work clay loam, 4 to 8 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 4 to 8 percent

Elevation: 4,500 to 5,900 feet

Mean annual precipitation: 15 to 19 inches

Frost-free period: 90 to 110 days

Composition

Major Components

Work and similar soils: 85 percent

Minor Components

Burnel clay loam: 0 to 5 percent

Soils with slopes more than 8 percent: 0 to 5 percent

Work gravelly clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Clay loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Available water capacity: Mainly 8.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

46D—Work clay loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces

Slope: 8 to 15 percent

Elevation: 4,500 to 5,850 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Work and similar soils: 85 percent

Minor Components

Work gravelly clay loam: 0 to 10 percent
 Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Surface layer texture: Clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

346E—Work cobbly sandy clay loam, 15 to 35 percent slopes, stony

Setting

Landform: Hills
Slope: 15 to 35 percent
Elevation: 5,150 to 5,750 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Work and similar soils: 90 percent

Minor Components

Reedwest sandy clay loam: 0 to 5 percent
 Work very stony loam: 0 to 3 percent
 Cabba sandy loam: 0 to 2 percent

Major Component Description

Surface layer texture: Cobbly sandy clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium or colluvium
Native plant cover type: Rangeland

Flooding: None
Available water capacity: Mainly 7.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

146D—Work gravelly clay loam, 8 to 15 percent slopes

Setting

Landform: Alluvial fans and stream terraces
Slope: 8 to 15 percent
Elevation: 4,550 to 6,150 feet
Mean annual precipitation: 15 to 19 inches
Frost-free period: 90 to 110 days

Composition

Major Components

Work and similar soils: 85 percent

Minor Components

Soils with slopes more than 15 percent: 0 to 5 percent
 Tamaneen clay loam: 0 to 5 percent
 Work cobbly clay loam: 0 to 5 percent

Major Component Description

Surface layer texture: Gravelly clay loam
Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover type: Rangeland
Flooding: None
Available water capacity: Mainly 8.0 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Yellowmule Series

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow
Landform: Mountains and hills
Parent material: Interbedded sandstone and shale residuum

Slope range: 4 to 60 percent

Elevation range: 5,200 to 8,800 feet

Annual precipitation: 25 to 30 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 30 to 70 days

Taxonomic Class: Fine, mixed, superactive Eutric
Haplocryalfs

Typical Pedon

Yellowmule loam, in an area of Yellowmule-Ouselfal complex, 8 to 25 percent slopes, in an area of forest land, 2,500 feet south and 1,900 feet west of the northeast corner of sec. 10, T. 7 S., R. 3 E.

Oi—0 to 1 inch; slightly decomposed leaves, needles, and twigs.

E1—1 to 7 inches; light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; weak fine angular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium and coarse roots; many very fine, common fine and few medium pores; 10 percent channers; slightly acid; clear wavy boundary.

E2—7 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, moderately sticky, and moderately plastic; many very fine and fine and few medium and coarse roots; many very fine, common fine and few medium pores; 10 percent channers; moderately acid; clear wavy boundary.

Bt1—11 to 20 inches; light brownish gray (10YR 6/2) clay loam, brown (10YR 5/3) moist; strong medium subangular blocky structure; hard, friable, very sticky, and very plastic; common very fine and fine and few medium roots; common very fine and few fine and medium pores; common distinct clay films on faces of peds and lining pores; 5 percent channers; moderately acid; gradual wavy boundary.

Bt2—20 to 31 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; hard, friable, moderately sticky, and moderately plastic; few very fine, fine, and medium roots; common very fine and few fine and medium pores;

common distinct clay films on faces of peds and lining pores; 5 percent channers, 20 percent soft shale chips; neutral; gradual wavy boundary.
Cr—31 to 60 inches; olive (5Y 5/3) semiconsolidated shale; neutral.

Range in Characteristics

Soil temperature: 34 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Depth to the Cr horizon: 20 to 40 inches

E1 horizon

Value: 5, 6, or 7 dry; 3 or 4 moist

Chroma: 1, 2, 3, or 4

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 25 percent—0 to 5 percent stones; 0 to 5 percent flagstones; 5 to 15 percent channers

Reaction: pH 5.6 to 6.5

E2 horizon

Value: 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Clay content: 20 to 27 percent

Content of rock fragments: 0 to 20 percent—0 to 5 percent stones; 0 to 5 percent flagstones; 0 to 10 percent channers

Reaction: pH 5.6 to 6.5

Bt1 horizon

Value: 5, 6, 7, or 8 dry; 3, 4, or 5 moist

Chroma: 2, 3, or 4

Texture: Clay loam, silty clay loam, or silty clay

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 25 percent—0 to 10 percent flagstones; 5 to 15 percent channers

Reaction: pH 5.6 to 6.5

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 5, 6, or 7 dry; 3, 4, or 5 moist

Chroma: 2, 3, 4, 5, or 6

Texture: Clay loam, clay, sandy clay loam, or sandy clay

Clay content: 35 to 50 percent

Content of rock fragments: 5 to 25 percent—0 to 10 percent flagstones; 5 to 15 percent channers

Reaction: pH 5.6 to 7.3

294F—Yellowmule-Lonniebee complex, 35 to 60 percent slopes, stony

Setting

Landform:

- Yellowmule—Mountains
- Lonniebee—Mountains

Slope:

- Yellowmule—35 to 60 percent
- Lonniebee—35 to 60 percent

Elevation: 5,200 to 6,650 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Yellowmule and similar soils: 50 percent

Lonniebee and similar soils: 35 percent

Minor Components

Cowood channery sandy loam: 0 to 8 percent

Soils with slopes more than 60 percent: 0 to 5 percent

Redlodge clay loam: 0 to 1 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Yellowmule

Surface layer texture: Channery loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.6 inches

Lonniebee

Surface layer texture: Flaggy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

294E—Yellowmule-Lonniebee, stony complex, 15 to 45 percent slopes

Setting

Landform:

- Yellowmule—Mountains
- Lonniebee—Mountains

Slope:

- Yellowmule—15 to 45 percent
- Lonniebee—15 to 45 percent

Elevation: 5,200 to 6,950 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Yellowmule and similar soils: 65 percent

Lonniebee and similar soils: 20 percent

Minor Components

Redlodge silty clay loam: 0 to 5 percent

Soils with slopes more than 45 percent: 0 to 5 percent

Cowood channery sandy loam: 0 to 3 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Yellowmule

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.9 inches

Lonniebee

Surface layer texture: Flaggy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

294D—Yellowmule-Lonniebee, stony-Redlodge complex, 4 to 15 percent slopes

Setting

Landform:

- Yellowmule—Hills
- Lonniebee—Hills
- Redlodge—Closed depressions

Slope:

- Yellowmule—4 to 15 percent
- Lonniebee—4 to 15 percent
- Redlodge—4 to 6 percent

Elevation: 5,950 to 6,300 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Yellowmule and similar soils: 60 percent

Lonniebee and similar soils: 20 percent

Redlodge and similar soils: 10 percent

Minor Components

Cowood channery sandy loam: 0 to 5 percent

Soils with slopes more than 15 percent: 0 to 5 percent

Major Component Description

Yellowmule

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.9 inches

Lonniebee

Surface layer texture: Flaggy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 3.2 inches

Redlodge

Surface layer texture: Silty clay

Depth class: Very deep (more than 60 inches)

Drainage class: Poorly drained

Dominant parent material: Alluvium

Native plant cover type: Rangeland

Flooding: None

Water table: Apparent

Available water capacity: Mainly 10.5 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

492E—Yellowmule-Ouselfal complex, 8 to 25 percent slopes

Setting

Landform:

- Yellowmule—Mountains
- Ouselfal—Mountains

Slope:

- Yellowmule—8 to 25 percent
- Ouselfal—8 to 25 percent

Elevation: 6,400 to 7,900 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Yellowmule and similar soils: 50 percent

Ouselfal and similar soils: 35 percent

Minor Components

Cowood channery sandy loam: 0 to 8 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Rock outcrop: 0 to 1 percent

Rubble land: 0 to 1 percent

Major Component Description

Yellowmule

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.9 inches

Ouselfal

Surface layer texture: Very channery sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

592E—Yellowmule-Ouselfal, very stony complex, 8 to 25 percent slopes

Setting

Landform:

- Yellowmule—Mountains
- Ouselfal—Mountains

Slope:

- Yellowmule—8 to 25 percent
- Ouselfal—8 to 25 percent

Elevation: 7,800 to 8,800 feet

Mean annual precipitation: 25 to 30 inches

Frost-free period: 30 to 55 days

Composition

Major Components

Yellowmule and similar soils: 50 percent

Ouselfal and similar soils: 35 percent

Minor Components

Cowood channery sandy loam: 0 to 10 percent

Soils with slopes more than 25 percent: 0 to 5 percent

Major Component Description

Yellowmule

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 4.9 inches

Ouselfal

Surface layer texture: Very flaggy sandy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 1.6 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

Zade Series

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Permeability: Moderately slow

Landform: Hills

Parent material: Interbedded sandstone and shale residuum

Slope range: 15 to 70 percent

Elevation range: 4,950 to 7,100 feet

Annual precipitation: 20 to 24 inches

Annual air temperature: 34 to 38 degrees F

Frost-free period: 50 to 70 days

Taxonomic Class: Fine-Loamy, mixed, superactive Ustic Argicryolls

Typical Pedon

Zade loam, in an area of Zade-Timberlin, stony complex, 35 to 60 percent slopes, in an area of forest land, 1,800 feet south and 500 feet east of the northwest corner of sec. 12, T. 1 N., R. 7 E.

Oi—0 to 1 inch; slightly decomposed forest litter.

A—1 to 10 inches; dark gray (10YR 4/2) loam, very dark gray (10YR 3/1) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky, and slightly plastic; many very fine and fine and few medium and coarse roots; neutral; clear smooth boundary.

Bt1—10 to 16 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, and slightly plastic; common very fine and few medium roots; common distinct clay films on faces of peds and lining pores; neutral; clear smooth boundary.

Bt2—16 to 37 inches; brown (10YR 4/3) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, moderately sticky, and moderately plastic; few very fine roots; common distinct clay films on faces of peds and lining pores; 5 percent pebbles; slightly acid; gradual wavy boundary.

Cr—37 to 60 inches; olive (5Y 5/3) interbedded soft sandstone and shale.

Range in Characteristics

Soil temperature: 36 to 40 degrees F

Moisture control section: Between 4 and 12 inches

Mollic epipedon thickness: 10 to 16 inches

Depth to the Cr horizon: 20 to 40 inches

A horizon

Value: 2 or 3 moist

Chroma: 1 or 2

Clay content: 15 to 25 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles or flagstones; 0 to 10 percent pebbles or channers

Reaction: pH 6.1 to 7.3

Bt1 horizon

Hue: 10YR or 2.5Y

Value: 4 or 5 dry; 3 or 4 moist

Chroma: 2 or 3

Texture: Clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles or flagstones; 0 to 10 percent pebbles or channers

Reaction: pH 6.1 to 7.3

Bt2 horizon

Hue: 10YR or 2.5Y

Value: 4, 5, or 6 dry; 3, 4, or 5 moist

Chroma: 3 or 4

Texture: Clay loam, sandy clay loam, or loam

Clay content: 25 to 35 percent

Content of rock fragments: 0 to 15 percent—0 to 5 percent cobbles or flagstones; 0 to 10 percent pebbles or channers

Reaction: pH 6.1 to 7.3

283G—Zade loam, 45 to 70 percent slopes

Setting

Landform: Hills

Slope: 45 to 70 percent

Elevation: 4,950 to 5,850 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Zade and similar soils: 90 percent

Minor Components

Timberlin stony loam: 0 to 4 percent

Copenhagen moist flaggy loam: 0 to 3 percent

Soils with slopes less than 45 percent: 0 to 2 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

283E—Zade-Adel complex, 15 to 45 percent slopes

Setting

Landform:

- Zade—Hills

- Adel—Hills

Slope:

- Zade—15 to 45 percent

- Adel—15 to 45 percent

Elevation: 5,050 to 6,600 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Zade and similar soils: 70 percent

Adel and similar soils: 20 percent

Minor Components

Timberlin stony loam: 0 to 4 percent

Copenhaver moist flaggy loam: 0 to 3 percent

Soils with slopes more than 45 percent: 0 to 2 percent

Rock outcrop: 0 to 1 percent

Major Component Description

Zade

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.2 inches

Adel

Surface layer texture: Loam

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained

Dominant parent material: Alluvium or colluvium

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 10.8 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

483F—Zade-Timberlin, stony complex, 35 to 60 percent slopes

Setting

Landform:

- Zade—Hills
- Timberlin—Hills

Slope:

- Zade—35 to 60 percent
- Timberlin—35 to 60 percent

Elevation: 5,000 to 7,100 feet

Mean annual precipitation: 20 to 24 inches

Frost-free period: 50 to 70 days

Composition

Major Components

Zade and similar soils: 70 percent

Timberlin and similar soils: 20 percent

Minor Components

Copenhaver flaggy loam: 0 to 8 percent

Rock outcrop: 0 to 2 percent

Major Component Description

Zade

Surface layer texture: Loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 6.2 inches

Timberlin

Surface layer texture: Flaggy loam

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Interbedded sandstone and shale residuum

Native plant cover type: Forest land

Flooding: None

Available water capacity: Mainly 2.2 inches

A typical description with range in characteristics is included, in alphabetical order, in this section.

Management

For management information about this map unit, see appropriate sections in Part II of this publication.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. (See Sodic (alkali) soil.)

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redox features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillite. Weakly metamorphosed mudstone or shale.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Avalanche chute. The track or path formed by an avalanche.

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular

to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-floored plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Bouldery. Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

Bouldery soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil material. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque. A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

COLE (coefficient of linear extensibility). (See Linear extensibility.)

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to

compression. Terms describing consistence are defined in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salt (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited.

Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

Grazeable forestland. Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser

depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Habitat type. An aggregation of all land areas capable of producing similar climax plant communities.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material.

Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties

include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasesers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well-sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It

is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $1/3$ - or $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during its entire life.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Miscellaneous water. A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep

sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Naturalized pasture. Forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots.

For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percolates slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile.

Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential natural community (PNC). The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

Potential rooting depth (effective rooting depth).

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Range condition. The present composition of the plant community on a range site in relation to the

potential natural plant community for that site.
(See Similarity index.)

Range site. (See Ecological site.)

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redox concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redox depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redox features. Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a

change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redox feature.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called

ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments.

They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transitional zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine

- sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.
- Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.
- Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.
- Similarity index.** A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.
- Sinkhole.** A depression in the landscape where limestone has been dissolved.
- Site class.** A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.
- Site curve (50-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.
- Site curve (100-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.
- Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.
- Skid trails.** Pathways along which logs are dragged to a common site for loading onto a logging truck.
- Slash.** The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.
- Slickens.** Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.
- Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip

- surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.
- Slickspot.** A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.
- Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:
- | | |
|--------------------------|----------------------|
| Nearly level | 0 to 2 percent |
| Gently sloping | 2 to 4 percent |
| Moderately sloping | 4 to 8 percent |
| Strongly sloping | 8 to 15 percent |
| Moderately steep | 15 to 25 percent |
| Steep | 25 to 45 percent |
| Very steep | more than 45 percent |
- Slope (in tables).** Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.
- Slow intake (in tables).** The slow movement of water into the soil.
- Slow refill (in tables).** The slow filling of ponds, resulting from restricted permeability in the soil.
- Small stones (in tables).** Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.
- Sodic (alkali) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.
- Sodicity.** The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $\text{Ca}^{++} + \text{Mg}^{++}$. The degrees of sodicity and their respective ratios are:
- | | |
|----------------|----------------|
| Slight | less than 13:1 |
| Moderate | 13-30:1 |
| Strong | more than 30:1 |
- Sodium adsorption ratio (SAR).** A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na

concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

Stony soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It

commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Tailwater. The water directly downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terracette. Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water-spreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The action of uprooting and tipping over trees by the wind.

Accessibility Statement

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United States
Department of
Agriculture

In cooperation with the
Montana Agricultural
Experiment Station



Natural
Resources
Conservation
Service



MT622—Soil Survey of Gallatin County Area, Montana

Part II



The original maps and tables have been deleted from this online version. Since the soil survey's publication, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/>).

How to Use This Soil Survey

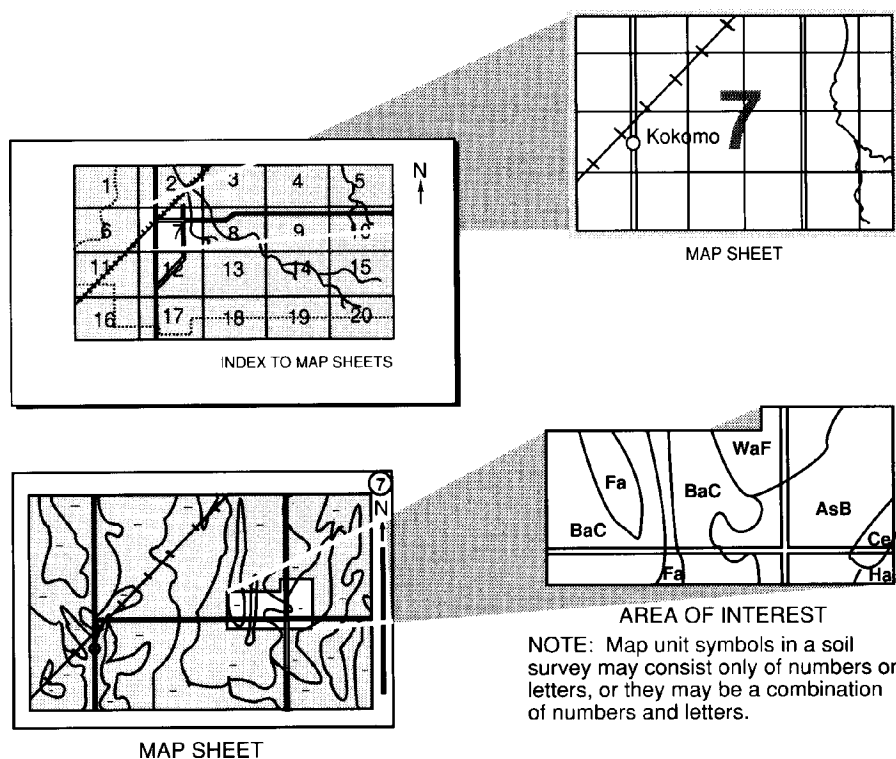
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, you can locate the Section, Township, and Range by zooming in on the **Index to Map Sheets**, or you can go to the Web Soil Survey at (<http://websoilsurvey.nrcs.usda.gov/app/>).

Note the map unit symbols that are in that area. The **Contents** lists the map units by symbol and name and shows the page where each map unit is described.

See the Contents for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1995. Soil names and descriptions were approved in 1996. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. This survey was made cooperatively by the Natural Resources Conservation Service and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Gallatin County Conservation District.

The most current official data are available through the NRCS Soil Data Mart website at <http://soildatamart.nrcs.usda.gov>. Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: This view of the snow-covered Bridger Mountains contains both private and public lands. The foreground soils of Adel-Copenhaver complex and the drainageway soils of Bridger-Redlodge complex are on private land while the Yellowmule-Lonnibee, stony complex soils in the timber-covered foothills are on public land. The public land, including the Bridger Mountains, has been mapped in the "Soil Survey of Gallatin National Forest, Montana" (1996).

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.

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Detailed Soil Map Unit Legend

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- 3A—Glendive sandy loam, 0 to 2 percent slopes
- 3C—Glendive sandy loam, 2 to 8 percent slopes
- 4A—Ryell silt loam, 0 to 2 percent slopes
- 12C—Burnel silty clay loam, 2 to 8 percent slopes
- 14C—Bowery loam, 2 to 8 percent slopes
- 18B—Clarkstone silt loam, 0 to 4 percent slopes
- 18C—Clarkstone silt loam, 4 to 8 percent slopes
- 19C—Marias silty clay, 4 to 8 percent slopes
- 20C—Headwaters loam, 2 to 8 percent slopes
- 20D—Headwaters loam, 8 to 15 percent slopes
- 23B—Patouza clay, 0 to 6 percent slopes
- 24C—Udecide silt loam, 4 to 8 percent slopes
- 25B—Musselshell loam, 0 to 4 percent slopes
- 26C—Sappington loam, 4 to 8 percent slopes
- 27B—Busby loam, 0 to 4 percent slopes
- 28C—Birney loam, 2 to 8 percent slopes
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- 32D—Amesha loam, 8 to 15 percent slopes
- 32E—Amesha-Trimad complex, 15 to 45 percent slopes
- 32F—Amesha loam, 35 to 60 percent slopes
- 33B—Attewan clay loam, 0 to 4 percent slopes
- 35B—Kalsted sandy loam, 0 to 4 percent slopes
- 35C—Kalsted sandy loam, 4 to 8 percent slopes
- 35D—Kalsted sandy loam, 8 to 15 percent slopes
- 36B—Brocko silt loam, 0 to 4 percent slopes
- 36C—Brocko silt loam, 4 to 8 percent slopes
- 36D—Brocko silt loam, 8 to 15 percent slopes
- 37B—Alona silty clay loam, 0 to 4 percent slopes
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- 38C—Chinook fine sandy loam, 4 to 8 percent slopes
- 38D—Chinook fine sandy loam, 8 to 15 percent slopes
- 38E—Chinook fine sandy loam, 15 to 35 percent slopes
- 40C—Tanna clay loam, 4 to 8 percent slopes
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- 60D—Alder-Cabba complex, 8 to 25 percent slopes
- 63B—Beanlake loam, 0 to 4 percent slopes
- 64B—Straw loam, 0 to 4 percent slopes

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71C—Quigley loam, 4 to 8 percent slopes
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72D—Doughty loam, 8 to 15 percent slopes
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82E—Philipsburg loam, 8 to 25 percent slopes
86F—Whitcow cobbly loam, 35 to 60 percent slopes, stony
90F—Jaegie loam, 35 to 60 percent slopes
91F—Whitore gravelly loam, 35 to 60 percent slopes, stony
92E—Martab loam, 15 to 45 percent slopes
96E—Loberg very flaggy loam, cool, 15 to 35 percent slopes, very stony
102A—Havre loam, 0 to 2 percent slopes, rare flooding
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135E—Kalsted gravelly sandy loam, 15 to 35 percent slopes
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149B—Beaverton cobbly loam, 0 to 4 percent slopes
155F—Anceney cobbly loam, 15 to 60 percent slopes
158B—Tamaneen clay loam, 0 to 4 percent slopes
163C—Beanlake gravelly loam, 4 to 8 percent slopes
163D—Beanlake gravelly loam, 8 to 15 percent slopes
166C—Windham gravelly loam, 4 to 8 percent slopes
166D—Windham gravelly loam, 8 to 15 percent slopes
178E—Copenhaver-Rock outcrop complex, 8 to 35 percent slopes
178F—Copenhaver flaggy loam, 35 to 60 percent slopes
179E—Bridger loam, cool, 4 to 25 percent slopes
182E—Bavdark gravelly coarse sandy loam, 8 to 25 percent slopes, stony
190E—Jaegie gravelly coarse sandy loam, 8 to 35 percent slopes
201A—Rivra cobbly sandy loam, 2 to 6 percent slopes
207B—Nesda loam, 2 to 6 percent slopes
212C—Burnel-Nythar complex, 2 to 8 percent slopes
220C—Headwaters cobbly loam, 2 to 8 percent slopes
225C—Musselshell cobbly loam, 2 to 8 percent slopes
225D—Musselshell cobbly loam, 8 to 15 percent slopes
226D—Sappington cobbly loam, 4 to 15 percent slopes
232C—Amesha cobbly loam, 2 to 8 percent slopes
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242C—Trimad cobbly loam, 4 to 8 percent slopes
242D—Trimad cobbly loam, 8 to 15 percent slopes
242E—Trimad cobbly loam, 15 to 35 percent slopes
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252D—Martinsdale cobbly loam, 8 to 15 percent slopes
254B—Clasoil cobbly sandy loam, 2 to 6 percent slopes
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- 304A—Ryell-Rivra-Fairway complex, 0 to 2 percent slopes
- 307A—Sudworth silty clay loam, 0 to 2 percent slopes
- 314C—Adel loam, 2 to 8 percent slopes
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- 336C—Brocko-Clarkstone silt loams, 4 to 8 percent slopes
- 336D—Brocko-Clarkstone silt loams, 8 to 15 percent slopes
- 339E—Tolbert cobbly loam, 8 to 35 percent slopes, very stony
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- 350B—Blackmore silt loam, 0 to 4 percent slopes
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- 354B—Farside loam, 2 to 6 percent slopes
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- 407A—Sudworth-Nesda loams, 0 to 2 percent slopes
- 410E—Blacksheep-Chinook-Rock outcrop complex, 15 to 45 percent slopes
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- 414E—Adel-Libeg complex, 15 to 35 percent slopes
- 415D—Cabba-Reedwest complex, 4 to 15 percent slopes
- 425E—Musselshell-Pensore, stony complex, 15 to 35 percent slopes
- 430E—Crago-Beanlake complex, 15 to 35 percent slopes
- 431B—Kelstrup-Brocko silt loams, 0 to 4 percent slopes
- 431C—Kelstrup-Brocko silt loams, 4 to 8 percent slopes

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- 431D—Kelstrup-Brocko silt loams, 8 to 15 percent slopes
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- 439D—Tolbert-Blaincreek complex, 2 to 15 percent slopes
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- 442B—Trimad loam, calcareous surface, 0 to 4 percent slopes
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- 487E—Catgulch, bouldery-Rock outcrop complex, 8 to 35 percent slopes

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- 490E—Uinta-Paddy complex, 15 to 45 percent slopes
- 491E—Hanson-Whitore, stony complex, 15 to 45 percent slopes
- 492E—Yellowmule-Ouselfal complex, 8 to 25 percent slopes
- 492F—Ouselfal-Yellowmule complex, 35 to 60 percent slopes
- 493F—Stemple very cobbly loam, 25 to 60 percent slopes, stony
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- 494F—Bangtail-Timberlin complex, moist, 35 to 60 percent slopes, stony
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- 500A—Bobkitty-Bonebasin complex, 0 to 2 percent slopes
- 502A—Toston loam, 0 to 2 percent slopes
- 503A—Meadowcreek, slightly saline-Rivra complex, 0 to 2 percent slopes
- 504A—Meadowcreek silty clay loam, 0 to 2 percent slopes
- 505A—Fairway-Rivra complex, 0 to 2 percent slopes
- 506A—Saypo silt loam, 0 to 2 percent slopes
- 507A—Soapcreek-Bonebasin complex, 0 to 2 percent slopes
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- 509B—Enbar loam, 0 to 4 percent slopes
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- 522A—Enbar clay loam, 0 to 2 percent slopes
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- GP—Gravel pit
- M-W—Miscellaneous water
- SLF—Sanitary landfill
- UL—Urban land
- W—Water

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For tables with the most current data, please visit the
Soil Data Mart at <http://soildatamart.nrcs.usda.gov/>.

Soil Survey of Gallatin County Area, Montana

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. In addition, this survey can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. To predict soil behavior, field experience and collected data on soil properties and performance are used.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. This information can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Interpretive ratings help engineers, planners, and others understand how soil properties influence important nonagricultural uses, such as building site development and construction materials. The ratings indicate the most restrictive soil features affecting the suitability of the soils for these uses.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Although soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

“Classification of the Soils” and “Acreage and Proportionate Extent of the Soils” tables at the end of this section show the classification and extent of the soils in this survey area.

Agronomy

General management needed for crops and for hay and pasture is suggested in this section. The system of land capability classification used by the Natural Resources Conservation Service is explained, and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider obtaining specific information from local Natural Resources Conservation Service or Cooperative Extension Service offices.

Cropland Limitations and Hazards

Management concerns affecting the use of the detailed soil map units in the survey area for crops are shown in the table, "Main Cropland Limitations and Hazards." The main concerns in managing nonirrigated cropland are conserving moisture, controlling soil blowing and water erosion, and maintaining soil fertility.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water infiltration rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control *soil blowing* and *water erosion*. Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, conservation cropping systems, crop-residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining *soil fertility* include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green-manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the limitations and hazards shown in the table cannot be easily overcome. These are *channels*, *flooding*, *depth to rock*, *ponding*, *gullies*, and *lack of timely precipitation*.

Additional limitations and hazards are as follows:

Areas of rock outcrop and slick spots—Farming around these areas may be feasible. Subsoiling or deep ripping soft sedimentary beds increases the effective rooting depth and the rate of water infiltration.

Excessive permeability—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor.

Lime content, limited available water capacity, poor tilth, restricted permeability, and surface crusting—These limitations can be overcome by incorporating green-manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer to soils that have a high content of lime.

Potential for ground-water pollution—This limitation is a hazard in soils with excessive permeability, hard bedrock, or a water table within the profile.

Short frost-free period—If the growing season is less than 90 days, short-season crops or grasses should be grown.

Slope—Where the slope is more than 8 percent, water erosion and soil blowing may be accelerated unless conservation farming practices are applied.

Surface rock fragments—This limitation causes rapid wear of tillage equipment; it cannot be easily overcome.

Surface stones—Stones or boulders on the surface can hinder normal tillage unless they are removed.

Salt and sodium content—In areas where this is a limitation, only salt- and sodium-tolerant crops should be grown.

On irrigated soils, the main management concerns are *efficient water use*, *nutrient management*, *control of erosion*, *pest and weed control*, and *timely planting and harvesting* for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes

erosion. It can also create drainage problems, raise the water table, and increase soil salinity.

Following is an explanation of the criteria used to determine the limitations or hazards.

Areas of rock outcrop—Rock outcrop is a named component of the map unit.

Areas of rubble land—Rubble land is a named component of the map unit.

Areas of slick spots—Slick spots are a named component of the map unit.

Channeled—The word “channeled” is included in the name of the map unit.

Depth to rock—Bedrock is within a depth of 40 inches.

Excessive permeability—The upper limit of the permeability range is 6 inches or more within the soil profile.

Flooding—The component of the map unit is occasionally flooded or frequently flooded.

Gullied—The word “gullied” is included in the name of the map unit.

Lack of timely precipitation—The component of the map unit has a xeric moisture regime. The amount of annual precipitation is no more than 14 inches.

Lime content—The component is assigned to wind erodibility group 4L or has more than 5 percent lime in the upper 10 inches. Wind erodibility groups are defined in the “Soil Properties” section.

Limited available water capacity—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 5 inches or less.

Ponding—Ponding duration is assigned to the component of the map unit.

Poor tilth—The component of the map unit has more than 35 percent clay in the surface layer.

Potential for ground-water pollution—The soil has a water table within a depth of 4 feet or hard bedrock within the profile, or permeability is more than 6 inches per hour within the soil.

Restricted permeability—Permeability is 0.06 inch per hour or less within the soil profile.

Salt content—The component of the map unit has an electrical conductivity of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

Short frost-free period—The map unit has a growing season of less than 90 frost-free days.

Slope—The upper slope range of the component of the map unit is more than 8 percent.

Sodium content—The sodium adsorption ratio of the component of the map unit is more than 13 within a depth of 30 inches.

Soil blowing—The wind erodibility index multiplied by the selected high C factor for the survey area and then divided by the T factor is more than 8 for the component of the map unit.

Surface crusting—The sodium adsorption ratio in the surface layer is 5 or more for any texture and 4 or more if the texture is silt, silt loam, loam, or very fine sandy loam.

Surface rock fragments—The terms describing the texture of the surface layer include any rock fragment modifier except for gravelly or channery, and “surface stones” is not already indicated as a limitation.

Surface stones—The terms describing the texture of the surface layer include any stony or bouldery modifier, or the soil is a stony or bouldery phase.

Water erosion—The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

Water table—The component of the map unit has a water table within a depth of 60 inches.

Crop Yield Estimates

The average yields per acre that can be expected of the principal crops are shown in the table, “Land Capability and Yields per Acre of Crops and Pasture.” In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit is shown in the table.

The nonirrigated small grain yields presented are a maximum potential estimated using a crop yield model based on Montana Agricultural Experiment Station Special Report number 35 (Brown and Carlson, 1990). Basic model assumptions include soil moisture at field capacity to 40 inches, a 70 percent annual precipitation probability as published by the National Climatic Center, fertilization to yield, and full pest and weed control. Irrigated small grain yields are not provided. The model has been validated with collected yield data.

Forage crop yields are estimates based mainly on experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that ensures the smallest possible loss.

For provided irrigated crop yields, it is assumed that the irrigation system is adapted to the soils and to the forage crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. Local offices of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Pasture and Hayland Management

Under good management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

Yield estimates are often indicated in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

The Natural Resources Conservation Service or the Cooperative Extension Service local offices can provide information about forage yields other than those shown in the table, "Land Capability and Yields per Acre of Crops and Pasture."

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, as described in "Land Capability Classification" (U.S. Department of Agriculture, 1961), soils generally are grouped at three levels: capability class, subclass, and unit. These levels indicate the degree and kinds of limitations affecting mechanized farming systems that produce the more commonly grown field crops, such as corn, small grains, cotton, hay, and field-grown vegetables. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use.

If properly managed, soils in classes 1, 2, 3, and 4 are suitable for the mechanized production of commonly grown field crops and for pasture and woodland. The degree of the soil limitations affecting the production of cultivated crops increases progressively from class 1 to class 5. The limitations can affect levels of production and the risk of permanent soil deterioration caused by erosion and other factors.

Soils in classes 5, 6, and 7 are generally not suited to the mechanized production of commonly grown field crops without special management, but they are suitable for plants that provide a permanent cover, such as grasses and trees. The severity of the soil limitations affecting crops increases progressively from class 5 to class 7. Local offices of the Natural Resources Conservation Service or the Cooperative Extension Service can provide guidance on the use of these soils as cropland.

Areas in class 8 are generally not suitable for cropland, pasture, or woodland without a level of management that is impractical. These areas may have potential for other uses, such as recreational facilities and wildlife habitat.

Capability subclasses indicate the dominant limitations in the class. These subclasses are designated by adding a letter, *E*, *W*, *S*, or *C*, to the class numeral, for example, 2*E*. The letter *E* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *W* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *S* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *C*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class 1 because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *W*, *S*, or *C* because the soils in class 5 are subject to little or no erosion. Class 5 soils have other limitations that

restrict their use mainly to pasture, rangeland, forest land, wildlife habitat, or recreation.

The capability classification of each map unit is given in the table, "Land Capability and Yields per Acre of Crops and Pasture," at the end of this section.

Prime Farmland and Other Important Farmland

In this section, prime farmland and other important farmland are defined. The soils in the survey area that are considered prime farmland are listed in the table, "Prime Farmland," at the end of this section.

Prime Farmland

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, forest land, or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites; sites for institutions or public buildings; small parks; golf courses; cemeteries; railroad yards; airports; sanitary landfills; sewage treatment plants; and water-control structures. Public land is land not available for farming in military reservations, national forests, national parks, and state parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and

growing season are favorable, and the level of acidity or alkalinity and the content of salts and sodium are acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods, and they are not frequently flooded during the growing season or are protected from flooding. Slopes range mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland where these limitations are overcome by drainage measures, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. The local office of the Natural Resources Conservation Service can provide more information about the criteria for prime farmland.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

The map units in the survey area that meet the requirements for prime farmland are listed in the table, "Prime Farmland." On some soils included in the table, measures that overcome limitations are needed. The need for these measures is indicated in parentheses after the map unit name. The location of each map unit is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described in the section "Soil Series and Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Unique Farmland

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil qualities, location, growing season, and moisture supply needed for the economic production of sustained high yields of a specific high-quality crop when treated and managed by acceptable farming methods. Examples of such crops are citrus, cranberries, olives, tree nuts, and vegetables.

Unique farmland is used for a specific high-value food or fiber crop; has an adequate supply of available moisture for the specific crop because of stored moisture, precipitation, or irrigation; and has a combination of soil qualities, growing season, temperature, humidity, air drainage, elevation, aspect, and other factors, such as nearness to markets, that favors the production of a specific food or fiber crop.

Lists of unique farmland are developed as needed in cooperation with conservation districts and others.

Additional Farmland of Statewide Importance

Some areas other than areas of prime and unique farmland are of statewide importance in the production of food, feed, fiber, forage, and oilseed crops. The criteria used in defining and delineating these areas are determined by the appropriate state agency or agencies. Generally, additional farmland of statewide importance includes areas that nearly meet the criteria for prime farmland and that economically produce high yields of crops when treated and managed by acceptable farming methods. Some areas can produce as high a yield as areas of prime farmland if conditions are favorable. In some states, additional farmland of statewide importance may include tracts of land that have been designated for agriculture by state law.

Farmland of statewide importance is included in the list of prime farmland. Criteria is available in the “Montana Field Office Technical Guide” (U.S. Department of Agriculture, Natural Resources Conservation Service, Section II).

Additional Farmland of Local Importance

This land consists of areas that are of local importance in the production of food, feed, fiber, forage, and oilseed crops and are not identified as having nationwide or statewide importance. Where appropriate, this land is identified by local agencies. It may include tracts of land that have been designated for agriculture by local ordinance.

Lists of this land are developed as needed in cooperation with conservation districts and others.

Erosion Factors

Soil erodibility (K) and soil-loss tolerance (T) factors are used in an equation that predicts the amount of soil lost through water erosion in areas of cropland. The procedure for predicting soil loss is useful in guiding the selection of soil and water conservation practices.

Soil Erodibility (K) Factor

The soil erodibility factor (K) indicates the susceptibility of a soil to sheet and rill water erosion. The soil properties that influence erodibility are those that affect the infiltration rate, the movement of water through the soil, and the water storage capacity of the soil and those that allow the soil to resist dispersion,

splashing, abrasion, and the transporting forces of rainfall and runoff. The most important soil properties are the content of silt plus very fine sand; the content of sand coarser than very fine sand; and the content of organic matter, soil structure, and permeability.

Fragment-Free Soil Erodibility (K_f) Factor

This is one of the factors used in the revised Universal Soil Loss Equation. K_f factor shows the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Soil-Loss Tolerance (T) Factor

The soil-loss tolerance factor (T) is an estimate of the maximum annual rate of soil erosion that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons of soil loss per acre per year. Ratings of 1 to 5 are used, depending on soil properties and prior erosion. The criteria used in assigning a T factor to a soil include maintenance of an adequate rooting depth for crop production, potential reduction of crop yields, maintenance of water-control structures affected by sedimentation, prevention of gully, and the value of nutrients lost through erosion.

Wind Erodibility Groups

Wind erodibility is directly related to the percentage of dry, nonerodible surface soil aggregates larger than 0.84 millimeter in diameter. From this percentage, the wind erodibility index factor (I) is determined. This factor is an expression of the stability of the soil aggregates or the extent to which they are broken down by tillage and the abrasion caused by windblown soil particles. Soils are assigned to wind erodibility groups (WEG) having similar percentages of dry soil aggregates larger than 0.84 millimeter. Wind erodibility groups are defined in the “Soil Properties” section.

Local offices of the Natural Resources Conservation Service or the Cooperative Extension Service can provide additional information about wind erodibility groups and K, K_f, T, and I factors.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and

cover for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well-prepared site and maintained in good condition.

Windbreaks are often planted on land that did not originally support trees. Knowledge of how trees perform on such land can be gained only by observing and recording the performance of trees that have been planted and have survived. Many popular windbreak species are not indigenous to the areas in which they are planted.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or poorly, depending on the characteristics of the soil. Each tree or shrub has definable potential heights in a given physiographic area and under a given climate. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

The "Windbreak Suitability Groups Species List" table shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in this table are based on measurements and observations of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local Natural Resources Conservation Service or Cooperative Extension Service offices or from a nursery.

Windbreak Suitability Groups

Windbreak suitability groups consist of soils in which the kinds and degrees of the hazards or limitations that affect the survival and growth of trees and shrubs in windbreaks are about the same.

Group 1 consists of soils that have no soil-related hazards or limitations or only slight hazards or limitations if they are used for windbreaks. Slopes are less than 15 percent.

Group 2M consists of soils that have a moderate available water capacity (5 to 10 inches) because of texture, depth, or both. The soils are well drained and not affected by salinity. A layer of concentrated lime, if it occurs, is below a depth of 24 inches. Slopes are less than 15 percent.

Group 2L consists of soils that have a layer of concentrated lime (more than 15 percent calcium carbonate equivalent) at a depth of about 15 to 24 inches. Available water capacity is at least 5 inches. Soils are well drained and not affected by salinity or alkalinity. (Electrical conductivity is less than 4 millimhos per centimeter.) Slopes are less than 15 percent.

Group 2W consists of soils that have an available water capacity of 5 inches or more. If the soils have a layer of concentrated lime, the layer is below a depth of 15 inches. Depth to a permanent water table is 30 to 60 inches. Soils are not affected by salinity. Slopes are less than 15 percent.

Group 2S consists of soils that are moderately affected by salinity. (Electrical conductivity is 4 to 12 millimhos per centimeter.) Available water capacity is at least 5 inches. A layer of concentrated lime, if it occurs, is at a depth of 15 inches or more. The water table is at a depth of 30 inches or more. Slopes are less than 15 percent.

Group 3M consists of soils that have an available water capacity of 2 to 5 inches because of texture, depth, or both. A layer of concentrated lime, if it occurs, is at a depth of 15 inches or more. Soils are well drained and not affected by salinity. (Electrical conductivity is less than 4 millimhos per centimeter.)

Group 3L consists of soils that have a layer of concentrated lime (more than 15 percent calcium carbonate equivalent) at a depth of less than 15 inches. A permanent water table is at a depth of more than 30 inches. Available water capacity is more than 5 inches. Soils are not affected by salinity. (Electrical conductivity is less than 4 millimhos per centimeter.) Slopes are less than 15 percent.

Group 3W consists of soils that have an available water capacity of 2 inches or more. If the soils have a layer of concentrated lime, the layer is below a depth of 15 inches. Depth to a permanent water table is 30 inches or less. The water table is more than 10 inches during all or most of the growing season. Soils are not affected by salinity. Slopes are less than 15 percent.

Group 3S consists of soils that are severely affected by salinity or alkalinity. (Electrical conductivity is 12 to 16 millimhos per centimeter.) Available water capacity is 5 inches or more. A layer of concentrated lime, if it occurs, is at a depth of more than 15 inches.

A permanent water table is at a depth of 30 inches or more. Slopes are less than 15 percent.

Group 4 consists of soils that have slopes of more than 15 percent, except for soils in areas where the length of the slopes is 100 feet or less and the less sloping soils have very severe limitations, including

soils that have a very low available water capacity (2 inches or less); very shallow, stony, or gravelly soils; strongly saline and alkali soils, in which the electrical conductivity is more than 16 millimhos per centimeter; and soils that have a pH of more than 9.0. Rock outcrop is also in this group.

Range

Sue Noggles, Rangeland Management Specialist, Natural Resources Conservation Service, assisted with the preparation of this section.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on range are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Rangeland is defined as land on which the historic climax plant community is predominantly grasses, grasslike plants, forbs, or shrubs. Rangeland includes lands revegetated naturally or artificially when routine management of that vegetation is accomplished mainly through manipulation of grazing. Rangeland include natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows (U.S. Department of Agriculture, 1997). The composition and production of the plant community are determined by soil, climate, topography, overstory canopy, and grazing management.

Grazeable forest land is defined as land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significant impairment of other forest values.

Native and naturalized pasture are defined as forest land and naturalized open areas, other than rangeland, that are used primarily for the production of forage for grazing by livestock and wildlife. Overstory trees, if present, are managed to promote naturally occurring native and introduced understory forage species located on the site (U.S. Department of Agriculture, 1997).

The table, "Rangeland and Grazeable Understory—Productivity and Characteristic Plant Communities," shows, for each listed soil, the ecological site (rangeland ecological site or representative habitat type); the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic native vegetation; and the average percent composition of each species. Only those soils that are used as rangeland or grazeable forest land, or

are suited to use as rangeland or grazeable forest land, are listed. Explanation of the column headings in this table follows.

Ecological site includes rangeland ecological site and representative habitat type as defined below.

Rangeland ecological site is a distinctive kind of rangeland with specific physical characteristics, which differs from other kinds of rangeland in its ability to produce a distinctive kind and amount of vegetation (U.S. Department of Agriculture, 1997).

Many different ecological sites are in the survey area. Over time, the combination of plants best suited to a particular soil and climate has become established. If the soil is not excessively disturbed, this group of plants is the natural plant community for the site. Natural plant communities are not static but vary slightly from year to year and place to place.

The relationship between soils and vegetation was ascertained during this survey; thus, ecological sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important. The "Montana Field Office Technical Guide," (U.S. Department of Agriculture, Natural Resources Conservation Service, Section II) available at local offices of the Natural Resources Conservation Service, can provide specific information about rangeland ecological sites.

Representative habitat type is an aggregation of all land areas capable of producing similar climax plant communities. Habitat types are considered basic ecological subdivisions of landscapes. Each is recognized by distinctive combinations of overstory and understory plant species at climax. They are named for the dominant or characteristic vegetation of the climax community. Habitat types are useful in soil surveys when assessing the combined effects of aspect, slope, elevation, and soil properties on potential plant growth. The representative habitat type or phase displayed in this table is documented in the Pfister system (Pfister and others, 1977).

Total annual production is the amount of vegetation that can be expected to grow annually on well-managed range that is supporting the historic climax plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruit of woody plants up to a height of 4.5 feet. Total annual production does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation, along with temperature, make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic native vegetation consists of the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil. The plants are listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. For grazed forest land, the table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of forest land in which the production of wood crops is highest.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Similarity Index

Similarity index, one method to evaluate an ecological site, compares the present plant community to the historic climax plant community for that site or to a desired plant community that is one of the site's potential vegetation states. The similarity index to the historic climax plant community is the percentage, by weight, of historic climax vegetation present on the site. Likewise, a similarity index to a desired plant community is

the percentage, by weight, of the desired plant community present on the site. As the name implies, this method assesses the similarity of the plant community to the historic climax or desired plant community. The similarity index can provide an indication of past disturbances, as well as future management or treatment, or both, needed to achieve the client's objectives (U.S. Department of Agriculture, 1997).

Abnormal disturbances that change the natural plant community include repeated overuse by livestock, excessive burning, erosion, and plowing. Grazing animals select the most palatable plants within a community. These plants will eventually die if they are continually grazed. A very severe disturbance can destroy the natural community. Under these conditions, less desirable plants, such as annuals and weeds, can invade. If the plant community has not deteriorated significantly, it eventually can return to dominantly natural plants if proper grazing management is applied.

Knowledge of the ecological site and the similarity index is necessary as a basis for planning and applying the management needed to maintain or improve the desired plant community for selected uses. Such information is needed to determine management objectives, proper grazing systems and stocking rates, suitable wildlife management practices, potential for recreational uses, and condition of watersheds.

Rangeland Management

Rangeland management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires knowledge of the similarity index for the ecological site.

The objective in grazing land management is to provide the kind of plant community that provides for and maintains a healthy ecosystem, produces quality forage for the grazing animals, and meets the needs of the grazing land enterprise and the desires of the landowner (U.S. Department of Agriculture, 1997). Proper grazing management generally results in the optimum production of vegetation, reduction of less desirable species, conservation of water, and control of erosion. Sometimes, however, a similarity index percentage somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Grazing management is the most important part of any rangeland management program. Proper grazing use, timely deferment of grazing, and planned rotation grazing systems are key practices. The experience of

ranchers and research has shown that if no more than one-half of the current year's growth is grazed, a plant community in good or excellent condition can be maintained, and one in fair condition can be improved. The remaining one-half enables plants to make and store food for regrowth and root development. As a result, the desirable plants remain healthy and are not replaced by less desirable grasses and weeds. Also, the plant cover protects the soil from water erosion and soil blowing, increases moisture retention, improves tilth, increases the rate of water infiltration, and helps to control runoff.

Certain practices commonly are needed to obtain a uniform distribution of grazing. These practices include developing livestock watering facilities, fencing, properly locating salt and mineral supplements, constructing livestock trails in steeply sloping areas, and riding or herding.

Various kinds of grazing systems can be used in range management. No single grazing system is best under all conditions. The grazing system should increase the quantity and improve the quality of the range vegetation; should meet the needs of the individual operator; and should be designed according to topography, type of grazing animals, and resource management objectives.

Special improvement practices are needed in areas where management practices do not achieve the desired results or where recovery is too slow under forage management alone. These practices include range seeding, brush management, water spreading, prescribed burning, and mechanical treatment.

Some soils are suited to mechanical treatment for range improvement. On other soils, however, only proper grazing management can improve the range. The "Agronomy" section defines capability classes. They are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. Many soils in capability classes 1 through 4 are suited to such practices as seeding, mechanical brush and weed control, and water spreading. Those soils in capability classes 7 and 8, however, are not suitable. Many soils in capability classes 1 through 4 are suited to tillage for seedbed preparation before native or introduced forage plant species are seeded. Soils in capability class 6 may be suited to limited surface disturbance, such as scarification, for seeding and as a means of increasing the rate of water infiltration for seed germination.

Where feasible, mechanical renovation practices, such as shallow chiseling, can help to speed recovery of the desired plants. These practices open up the surface and thus allow absorption of more moisture and production of more desirable plants. Mechanical renovation, brush management, and timely deferment of grazing allow recovery of desired plants.

Seeding may be needed in areas where less desirable plants are dominant. A clean, firm seedbed should be prepared, suitable species should be selected for seeding, and rest periods should be long enough to allow the new plants to become established. Special improvement practices can be effective only if the management system helps to keep the desirable plants healthy.

Understory Management

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some forest land can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

Forest understory production can be influenced by controlling canopy density in addition to the management of stocking rates, distribution, and season of use. Often both the woodland and range resources can be enhanced through thinning the overstory to canopy levels that optimize both timber and forage production. Broadcast seeding of disturbed areas soon after timber harvest can improve forage quantity and quality and reduce the chances of undesirable plants occupying the site.

Steepness of slopes and distance to drinking water are severe grazing management problems in much of the mountain and foothill areas. Variations in primary season of use, production levels, and plant communities due to elevation and aspect changes present additional challenges. Long, steep slopes provide limited access to livestock. Less sloping areas are subject to overuse. Grazing should be delayed until the soil is firm enough to withstand trampling and the plants have matured enough to withstand grazing pressure.

Riparian areas should be protected from overuse by livestock. Misuse results in deterioration of protective vegetation, reduction of streambank stability, and excessive erosion. Developing off-stream watering locations can successfully prevent cattle from overgrazing riparian areas and encourage better livestock distribution.

Forest Land

There are approximately 879,100 acres within the survey area. According to the Montana Department of Natural Resources and Conservation, forested lands include nearly 28 percent, or just over 250,000 acres. Of this amount, about 7 percent, or around 17,000 acres, is considered noncommercial. Most of the commercial forest land, about 78 percent, is generally of low productivity, producing less than 50 cubic feet per acre per year. Board-foot volumes are based on Scribner's log rule and include all trees larger than 10-inch diameter breast height to an 8-inch top diameter inside bark (Dahms, 1964). Net volume of sawtimber was estimated in 1989 to be approximately 898,719,000 board feet; 98 percent of that amount is softwood timber (Chojnacky, 1991). Around 56 percent of the commercial forest land are on private land, and about 37 percent are on forest industry land (Montana Department of Natural Resources and Conservation, 1979). In 1988, about 21,304,000 board feet was removed as sawtimber from timberland outside the national forests (Conner, 1993). The Montana Department of Natural Resources and Conservation, Division of Forestry; U.S. Forest Service; and local fire districts protect the forest land within the survey area from fire.

Soils vary in their ability to support the growth of trees. Depth, fertility, texture, and available water capacity influence tree growth. Elevation, aspect, soil, and climate determine the kinds of trees that can be expected on any site and their growth rate. The forested soils in the soil survey area range from shallow to very deep, from nongravely to extremely gravely, and from fine-textured to coarse-textured. Because of differences among the soils as well as differences in climate, topography, and geology, the forests vary in composition and productivity.

The coniferous forested land within the survey area can be divided into four distinct areas. These are 1) the Horseshoe Hills, the northern part of Gallatin County, plus the western side of the Bridger Mountain Range; 2) Bridger Canyon, Bozeman Pass, and the foothills of the Gallatin Range south of Bozeman; 3) Big Sky; and 4) the Spanish Peaks.

The Horseshoe Hills, the northern part of Gallatin County, plus the western side of the Bridger Mountain

Range have predominately Douglas-fir overstories with isolated areas of lodgepole pine. The area typically is in the 18- to 22-inch precipitation zone. Limestone and dolomite influence the soils in the area, but there are smaller areas of gneiss, schist, interbedded sandstone, and shale. Douglas-fir/snowberry and Douglas-fir/pinegrass habitat types occur on the northerly aspects, and Douglas-fir/bunchgrass habitat types occur on the southerly aspects. Some associated soil series on the limestone- and dolomite-influenced soils are the Accola and Whitore soils on the northerly aspects and the Lap, Whitecow, and Windham soils on the southerly aspects. In the interbedded sandstone, and shale areas, Bangtail and Zade soil series occur. On the western side of the Bridger Mountain Range, gneiss, schist, and sandstone formations occur. Some associated soil series are the Cowood, Rocko, and Shadow soils.

Bridger Canyon, Bozeman Pass, and the foothills of the Gallatin Range south of Bozeman have predominately Douglas-fir overstories with significant areas of lodgepole pine. Present in the understory, but generally not dominant in the overstory, are areas of Engelmann spruce and subalpine fir. The area typically is in the 20- to 28-inch precipitation zone. The forest understory plant community is dominated by ninebark, snowberry, and pinegrass habitat types in the warmer, dryer areas and blue huckleberry and white spirea habitat types in the cooler, moister areas. The soils in the Bozeman Pass and Bridger Canyon areas are formed from interbedded sandstone and shale. Some soil series associated with that area are the Bangtail, Billman, Hoppers, Lonniebee, Timberlin, and Yellowmule soils. The soils in the foothills of the Gallatin Range south of Bozeman are formed from gneiss and schist. Some soil series associated with that area are the Jaegie and Shadow soils.

The Big Sky area has an equal mix of Douglas-fir, lodgepole pine, Engelmann spruce, and subalpine fir in the overstories. The area typically is in the 24- to 30-inch precipitation zone. The forest understory plant community is dominated by snowberry and pinegrass habitat types in the warmer, dryer areas and grouse whortleberry, twinflower, and blue huckleberry habitat

types in the cooler, moister areas. The soils in the Big Sky area are formed from interbedded sandstone and shale with some volcanics. Some soil series associated with that area are the Bangtail, Loberg, Ouselfal, Timberlin, and Yellowmule soils. In the southwestern corner of the Big Sky area above 7,800 feet elevation are areas of whitebark pine, Engelmann spruce, and subalpine fir. The forest understory plant community is a grouse whortleberry habitat type.

Forested areas of the survey area generally range between 5,200 and 6,800 feet in elevation. The Big Sky forested area is greater than 6,200 feet and ranges up to 8,200 feet.

The Spanish Peaks area has a Douglas-fir overstory. The area is typically in the 18- to 22-inch precipitation zone. The forest understory plant community is dominated by snowberry and ninebark habitat types. The soils are formed from gneiss and schist. The Spanpeak soil series is associated with the area.

Douglas-fir is the cover type occupying the largest acreage. Cover types of lodgepole pine, Engelmann spruce, subalpine fir, whitebark pine, black cottonwood, narrowleaf cottonwood, plains cottonwood, and quaking aspen cover lesser acreages.

Black cottonwood and narrowleaf cottonwood are found along the Gallatin, Jefferson, and Madison rivers and some of the major tributaries that enter these rivers. The area is typically in the 12- to 18-inch precipitation zone. The forest understory plant community is a snowberry habitat type. These cottonwoods are associated with the Bandy, Bonebasin, McCabe, and Rivra soils developed in recent alluvium.

Narrowleaf cottonwood and plains cottonwood are found along the Missouri River. The area is typically in the 10- to 14-inch precipitation zone. The forest understory plant community is a snowberry habitat type with Rocky Mountain juniper present. These cottonwoods are associated with the Rivra and McCabe soil series.

Quaking aspen is found primarily in areas where there are formations of gneiss, schist, interbedded sandstone, and shale. In this survey area, quaking aspen stands are considered noncommercial forest land. Quaking aspen are associated with the Adel, Bavdark, Bridger, and Enbar soil series. Soils in positions to receive extra moisture as run-in are very deep and have moderate to high available water capacity. Quaking aspen is most frequently found in the 18- to 28-inch precipitation zone. The forest understory plant community is a snowberry habitat type.

Site index values for the survey area can be broken down into three ranges: 1) Site index values for Douglas-fir that range from 40 to 45 can be found in the western side of the Bridger Mountain Range and the northern Gallatin County areas; 2) Site index values for Douglas-fir that range from 48 to 52 can be found in the Bozeman Pass, the foothills of the Gallatin Range, Big Sky, and the Spanish Peaks areas; 3) Site index values for Douglas-fir that range from 28 to 35 can be found on low productive sites where the soils are shallow and/or droughty.

Forest managers can use the "Forest Land Management" and "Forest Land Productivity" tables to plan the use of soils for wood crops. Only those soils suitable for wood crops are listed.

Woodland Ordination System

The "Forest Land Management" table lists the ordination (woodland suitability) symbol for each soil. The ordination system is a nationwide uniform system of labeling soils or groups of soils that are similar in use and management. The primary factors evaluated in the woodland ordination system are productivity of the forest overstory tree species and the principal soil properties resulting in hazards and limitations that affect forest management. There are three parts of the ordination system—class, subclass, and group. The class and subclass are referred to as the ordination symbol.

Ordination Class Symbol

The first element of the ordination symbol is a number that denotes potential productivity in terms of cubic meters of wood per hectare per year for the indicator tree species; the larger the number, the greater the potential productivity. Potential productivity is based on site index and the corresponding culmination of mean annual increment. For example, the number 1 indicates a potential production of 1 cubic meter of wood per hectare per year (14.3 cubic feet per acre per year), and 10 indicates a potential production of 10 cubic meters of wood per hectare per year (143 cubic feet per acre per year).

Indicator species is a species that is common in the area and is generally, but not necessarily, the most productive on the soil. The species determines the ordination class. In the "Forest Land Productivity" table, an indicator species is the first species listed for a particular map unit. This table shows the productivity for all species where data have been collected.

Site index is determined by taking height measurements and determining the age of selected

trees within stands of a given species (Alexander, 1966). This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. The site indexes shown in the "Forest Land Productivity" table are averages based on measurements made at sites that are representative of the soil series. When the site index and forest land productivity of different soils are compared, the values for the same tree species should be compared (Dahms, 1964). The higher the site index number, the more productive the soil for that species. Site index values are used in conjunction with yield tables (Meyer, 1938) to determine mean annual yields. Indirectly, they are used to determine the productivity class in the ordination class symbol.

Expected tree growth rate and the diversity of trees on a site are determined by a combination of elevation, aspect, soils, and climate. The ability of soils to support tree growth is dependent on variability in soil depth, fertility, texture, and available water capacity. Forested soils in the area range from shallow to very deep, nongravelly to extremely gravelly, fine textured to coarse textured, and those containing no lime to those containing high amounts of lime.

Listed below is information pertaining to the development of forest land tables in the area. Site index ratings were developed using the following references: black cottonwood (Sauerwein, 1979), Douglas-fir (Brickell, 1968), Engelmann spruce (Alexander, 1967), lodgepole pine (Alexander, 1966), and quaking aspen (Baker, 1925). Locally adapted site index curves, developed by the Natural Resources Conservation Service, were used for plains cottonwood.

Productivity ratings were made based on timber being harvested by the clear-cut method and slash burned. It is assumed that reasonable care was used in logging, so that funneling of skid trails did not occur to concentrate the water, excessive disturbance did not occur, and coarser material from slash disposal remained.

Equipment limitations were related to logging operations. Of prime consideration were difficulties encountered in yarding logs and the influence of logging activities on soil properties. Primary soil features considered for this rating were slope, soil texture, soil depth, seasonal soil wetness, and stoniness.

Seedling mortality ratings apply to planting stock one or two years of age, with the evaluation period beginning at the time of planting. For natural regeneration, the evaluation period was considered to begin a year after germination.

Windthrow hazard ratings were developed as follows:

Soils on north slopes that remain moist into the spring, and those having a high basal area to limit root development, were considered moderately prone to windthrow even though the soil materials provided a good anchoring medium for tree roots. On drier sites, clayey soils without rock fragments were also considered in this category.

Soils having a high water table (within 20 inches of the surface) long enough to inhibit root development were considered to be severely susceptible to windthrow.

When making ratings for plant competition, the limitation was considered slight if adequate regeneration usually occurs on a soil within 5 years.

For most species, overstory yield estimates were determined from the average annual yield versus site index curves. These curves were developed by adjusting data presented in yield tables published from several different sources. Average annual yield values were computed at the culmination of mean annual increment. Total cubic-foot-volume estimates are based on trees that are more than 4-inch diameter breast height.

"Even-aged Stands of Ponderosa Pine" (Meyer, 1938) was used for estimating yields of Douglas-fir and ponderosa pine. "Aspen in the Central Rocky Mountain Region" (Baker, 1925) was used to estimate quaking aspen yields.

Ordination Subclass Symbol

The second element, or subclass, of the ordination symbol is a capital letter that indicates certain soil or physiographic characteristics that contribute to important hazards or limitations to be considered in management. The subclasses are defined as follows:

Subclass X indicates that forest land use and management are limited by stones or rocks.

Subclass W indicates that forest land use and management are significantly limited by excess water, either seasonally or throughout the year. Restricted drainage, a high water table, or flooding can adversely affect either stand development or management.

Subclass T indicates that forest land use and management are limited by a root zone that has toxic substances. Excessive alkalinity, acidity, sodium salts, or other toxic substances impede the development of desirable species.

Subclass D indicates that forest land use and management are limited by a restricted rooting depth. The rooting depth is restricted by hard bedrock, a hardpan, or other restrictive layers in the soil.

Subclass C indicates that forest land use and management are limited by the kind or amount of clay in the upper part of the soil.

Subclass S indicates that forest land use and management are limited by sandy soil, a low available water capacity, and a normally low content of available plant nutrients. The use of equipment is limited during dry periods.

Subclass F indicates that forest land use and management are limited by a high content of rock fragments that are larger than 2 millimeters and smaller than 10 inches. This subclass includes flaggy soils.

Subclass R indicates that forest land use and management are limited by excessive slope.

Subclass A indicates that no significant limitations affect forest land use and management.

Forest Land Management and Productivity

Information about the productivity and management of the forested map units in the survey area is given in the “Forest Land Management” and “Forest Land Productivity” tables.

Management Concerns

In the “Forest Land Management” table, the soils are rated for erosion hazard, equipment limitation, seedling mortality, windthrow hazard, and plant competition.

Erosion hazard is *slight* if there is little or no hazard of erosion, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive soil loss.

Equipment limitation is *slight* if the use of equipment is not limited to a particular kind of equipment or time of year; *moderate* if there is a short seasonal limitation or a need for some modification in the management of equipment; and *severe* if there is a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings are for seedlings from good planting stock that are properly planted during a period of average rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Windthrow hazard is *slight* if trees in wooded areas are not expected to be blown down by commonly

occurring winds, *moderate* if some trees are blown down during periods of excessive soil wetness and strong winds, and *severe* if many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Plant competition is *slight* if there is little or no competition from other plants; *moderate* if plant competition is expected to hinder the development of a fully stocked stand of desirable trees; and *severe* if plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

Potential Productivity

The potential productivity of merchantable or *common trees* is expressed as a site index, which is described under the heading “Ordination Class Symbol.” Commonly grown trees are those that forest land managers generally favor in intermediate or improvement cuttings. They are selected based on growth rate, quality, value, and marketability.

The column *Trees that stands are commonly managed for* in the “Forest Land Productivity” table lists trees that are suitable for commercial wood production and that are suited to the soils.

Main Forest Access Road Limitations and Hazards

The major management concerns affecting the use of the detailed soil map units in the survey area for forest access roads are listed in the “Main Forest Access Road Limitations and Hazards” table. The significance of each limitation or hazard and the criteria used to determine the limitation or hazard are described in this section.

Areas of Rock outcrop and *depth to bedrock* can increase the cost of road construction and influence route planning. Constructing roads is difficult because of the need for rock removal and the need for additional soil material to provide a suitable road surface.

Boulders increase the cost of road construction and influence route planning. Construction is difficult mainly because of the need for extraction and disposal of the boulders.

Dustiness of the road surface material may cause safety problems and accelerate equipment wear. Dust-abatement measures are needed during dry periods.

Flooding in the area where a road is constructed may restrict use, result in damage to the roadway, and result in the sedimentation of waterways. The hazard of flooding can be reduced by installing a drainage system, elevating the roadbed, and using riprap and diversions.

Low soil strength of the soil material used to construct the road surface can result in rutting, in drainage problems, and in poor trafficability during wet periods. The road should be used only during dry periods or when the surface is frozen. Surfacing with material of suitable strength and installing a drainage system can help to overcome this limitation.

Roadbed material that has a high *shrink-swell potential* shrinks and swells markedly during dry and wet periods. Excessive shrinking and swelling can damage the road surface or other features, such as bridge abutments, culverts, and erosion-control structures.

A steep *slope* results in increased construction and maintenance costs and increased sedimentation because of the large cuts necessary to create an adequate roadbed. Seeding the cut slope to suitable vegetation minimizes sedimentation. Large cuts can increase instability of the slope. Where slumping is a hazard, slope failure can become a significant maintenance and environmental problem.

Slumping causes safety problems and increases maintenance costs. Frequent clearing of slumped soil in the roadbed or rebuilding of the roadway may be needed to keep the road serviceable and drainage systems functioning.

Stones cause problems in maintaining a smooth road surface that has good trafficability. Unless the stones are removed, additions of suitable stone-free material may be needed when the road is surfaced.

The erodibility of the soil material in the roadbed influences the probability of *water erosion* resulting from the channeling of runoff in the roadway. Erosion can result in the sedimentation of streams. It can be controlled by reducing road grades and controlling runoff onto and off of the road surface through the installation of drainage measures.

Roads built across soils that have a *water table* may require substantial ballast, fabric, internal drainage systems, and other measures that maintain a road surface that has good trafficability. Construction and use of the road only during periods when the water table is not near the surface or when the road is frozen help to maintain trafficability and reduce the potential for site damage.

Following is an explanation of the criteria used to determine the limitations or hazards.

Areas of Rock outcrop—Rock outcrop is a named component of the map unit.

Areas of Rubble land—Rubble land is a named component of the map unit.

Boulders—The terms describing the texture within a depth of 24 inches include a bouldery modifier, or the soil is a bouldery phase.

Depth to rock—Hard bedrock is within a depth of 60 inches.

Dustiness—The surface layer is silt, silt loam, loam, or very fine sandy loam.

Flooding—The component of the map unit is occasionally flooded or frequently flooded.

Low soil strength—The component of the map unit has one of the following Unified classifications (ASTM, 1993) within the 60-inch profile: ML, CL, MH, CH, OL, PT, or GC.

Shrink-swell potential—The component of the map unit has a high shrink-swell potential in a layer that is at least 10-inches thick and is within 40 inches of the surface.

Slope—The upper slope limit is more than 35 percent.

Slumping—The component of the map unit meets the requirements for low soil strength and has slopes of more than 35 percent.

Stones—The terms describing the texture within a depth of 24 inches include a very stony or extremely stony modifier, or the soil is a very stony or extremely stony phase.

Water erosion—The surface K factor multiplied by the upper slope limit is more than 10.

Water table—The component of the map unit has a water table within a depth of 60 inches.

Recreation

The soils of the survey area are rated in the "Recreational Development" table according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, ability of the soil to support vegetation, access to water, potential water impoundment sites, and either access to public sewer lines or the capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degrees, for recreational uses by the duration of flooding and the season when it occurs. Onsite assessment of the height, duration, intensity, and frequency of flooding is essential in planning recreational facilities.

Camp areas are tracts of land used intensively as sites for tents, trailers, and campers, and for outdoor activities that accompany such sites. These areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The soils are rated based on soil properties that influence the ease of developing camp areas and performance of the areas after development. Also considered are the soil properties that influence trafficability and promote the growth of vegetation after heavy use.

Picnic areas are natural or landscaped tracts of land that are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The soils are rated based on soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation after development. The surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Playgrounds are areas used intensively for baseball, football, or similar activities. These areas

require a nearly level soil that is free of stones and that can withstand heavy foot traffic and maintain an adequate cover of vegetation. The soils are rated based on soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation. Slope and stoniness are the main concerns in developing playgrounds. The surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Paths and trails are areas used for hiking and horseback riding. These areas should require little or no cutting and filling during site preparation. The soils are rated based on properties that influence trafficability and erodibility. Paths and trails should remain firm under foot traffic and not be dusty when dry.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, not dusty when dry, and not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

The interpretive ratings in this table help engineers, planners, and others to understand how soil properties influence recreational uses. Ratings for proposed uses are given in terms of limitations. Only the most restrictive features are listed. Other features may limit a specific recreational use.

The degree of soil limitation is expressed as slight, moderate, or severe.

Slight means that soil properties are favorable for the rated use. The limitations are minor and can be easily overcome. Good performance and low maintenance are expected.

Moderate means that soil properties are moderately favorable for the rated use. The limitations can be overcome or modified by special planning, design, or maintenance. During some part of the year, the expected performance may be less desirable than that of soils rated *slight*.

Severe means that soil properties are unfavorable for the rated use. Examples of limitations are slope, bedrock near the surface, flooding, and a seasonal high water table. These limitations generally require major soil reclamation, special design, or intensive maintenance. Overcoming the limitations generally is difficult and costly.

The information in the "Recreational Development" table can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in the "Building Site Development" table and interpretations for septic tank absorption fields in the "Sanitary Facilities" table.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. If food, cover, or water is missing, inadequate, or inaccessible, wildlife will be scarce or will not inhabit an area.

If the soils have potential for wildlife habitat development, habitat can be created or improved by planting appropriate vegetation, properly managing the existing plant cover, and fostering the natural establishment of desirable plants.

Elements of Wildlife Habitat

The following paragraphs describe the elements of wildlife habitat.

Grain and seed crops are domestic grains and seed-producing herbaceous plants used by wildlife. Examples of these crops grown in the Gallatin Valley are barley, oats, wheat, and, occasionally, oil seed crops such as buckwheat, canola, and sunflower.

Grasses and legumes are domestic perennial grasses and herbaceous legumes planted for wildlife food and cover. Examples of grasses and legumes in the survey area are alfalfa, brome, clover, meadow fescue, orchardgrass, reed canarygrass, timothy, and trefoil.

Wild herbaceous plants are native or naturally established forbs, grasslikes, and grasses that provide food and cover for wildlife. Examples of wild herbaceous plants in the survey area are American licorice, American vetch, basin wildrye, geranium, goldenrod, wheatgrass, Idaho fescue, lupine, milkvetch, needlegrass, prairie clover, sedge, and sunflower.

The major soil properties affecting the growth of forage and grain crops and wild herbaceous plants are depth of the root zone, texture of the surface layer, amount of water available to plants, wetness, salinity or sodicity, and flooding. The length of the growing season also is important.

Deciduous trees and woody understory produce bark, buds, catkins, foliage, nuts or other fruit, and twigs that wildlife eat. Examples of deciduous trees and woody understory in the survey area are antelope

bitterbrush, birch, grouse whortleberry, huckleberry, mountain mahogany, Oregon grape, quaking aspen, Rocky Mountain maple, skunkbush sumac, and willow. Examples of fruit-producing shrubs in the survey area are American plum; buffaloberry, both russet and silver, chokecherry; hawthorn; honeysuckle; redosier dogwood; rose; and serviceberry.

Coniferous plants are cone-bearing trees, ground covers, or shrubs that provide habitat or supply food in the form of browse, fruitlike cones, or seed. Examples of coniferous plants in the survey area are Douglas-fir; limber and lodgepole pine; and common, horizontal, and Rocky Mountain juniper.

The major soil properties affecting the growth of coniferous and deciduous trees and shrubs are amount of water available to plants, depth of the root zone, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Wetland plants produce food or cover for wetland wildlife. Examples of wetland plants in the survey area are bulrush, cattail, rush, sedge, smartweed, and waterplantain, and some grasses, such as mannagrass, reed canarygrass, and reedgrass.

The major soil properties affecting wetland plants are acidity or alkalinity, slope, texture of the surface layer, and wetness.

Shallow-water areas have an average depth of less than 5 feet. These areas, either naturally wet or created by dams, levees, or water-control measures in marshes or streams, are useful as habitat for some wildlife species. Examples of shallow-water areas in the survey area are beaver ponds and other wildlife ponds, muskrat marshes, waterfowl feeding areas, and wildlife watering developments.

The major soil properties affecting shallow-water areas are depth to bedrock, permeability, slope, surface stoniness, and wetness.

Kinds of Wildlife Habitat

Habitat for openland wildlife consists of cropland, meadows, pasture, and other areas that are overgrown with grasses, herbs, and shrubs. These

areas produce grain and seed crops, grasses, legumes, and wild herbaceous plants. Wildlife attracted to openland areas include cottontail rabbit, field sparrow, Hungarian partridge, killdeer, meadowlark, pheasant, red fox, sage grouse, and sharp-tailed grouse.

Habitat for woodland wildlife consists of areas of coniferous or deciduous trees and shrubs or a mixture of these and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to woodland areas include black bear, deer, elk, owl, porcupine, raccoon, ruffed grouse, thrush, tree squirrel, wild turkey, and woodpecker.

Habitat for wetland wildlife consists of open, marshy or swampy, shallow-water areas that support water-tolerant plants. Wildlife attracted to wetland areas include beaver, bittern, duck, geese, heron, kingfisher, mink, muskrat, otter, and rail.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland areas include antelope, deer, lark bunting, meadowlark, and sage grouse.

Wildlife of the Gallatin County Area

Coniferous forests, grasslands, mountains (from rolling uplands to glaciated peaks), irrigated and nonirrigated cropland, marshes, ponds, reservoirs, riparian woodlands, rivers, and streams provide habitat diversity for wildlife of the Gallatin County Area.

Moose occur mainly in the eastern and southern parts of the survey area. In summer and fall, they extensively use fir, pine, and spruce forests. Moose move along drainages to lower-elevation winter ranges where they utilize a variety of willows and other deciduous shrubs and trees. Forbs and aquatic plants are important components of their spring and summer diet.

Rocky Mountain elk occur in the mountain ranges in the northern, eastern, and southern parts of the survey area. Based on winter food availability, elk habitats are classed as either grass or browse ranges. Browse ranges predominate in the mountains of the Gallatin County Area. Elk spend summer and fall at relatively high elevations where moist, lush forest growth is interspersed with grassy mountain meadows. In forested environments, elk thrive best during the shrub stage of plant succession.

Both mule deer and white-tailed deer are located throughout the survey area. Mule deer occur at mid to high elevations and along the foothills of major mountain ranges. White-tailed deer generally inhabit the foothills, lowlands and valleys, and stream bottoms. Winter ranges occur along the footslopes of

the Bridger Mountains, on the eastern side of the survey area, and the Gallatin and Madison ranges to the south.

Populations of bighorn sheep reside in the Spanish Peaks Wilderness Area in the southwestern part of the survey area while pronghorn antelope inhabit open, rolling grassland prairies in the northwestern part.

Mountain goats and grizzly bears inhabit the Bridger, Madison, and Gallatin Mountain ranges. Black bear are common in forests and drainageways throughout the area.

Ring-necked pheasant and gray, or Hungarian, partridge are found on, or adjacent to, the farmlands of the northern half of the survey area. A varied land-use pattern that includes annual weeds, brushy cover, cattail marshes, small grains, and irrigated and dry cropland support these introduced game birds.

Land management practices beneficial to pheasant and partridge include prescribed grazing use, maintenance of woody cover, and the retention of stubble and waste grain during winter through elimination of fall tillage. Field hedgerows and shelterbelts are beneficial to pheasant and partridge by providing woody cover for shelter and winter food supply. The bottomlands that support habitat for pheasant include brushy ditchbanks and drainageways, cattail marshes, and dry and irrigated cropland.

Three species of forest-dwelling grouse—blue, spruce, and ruffed—are found in the coniferous forests and riparian woodlands of the survey area. A variety of habitats, such as brushy draws, grazeable woodlands, mixed forests, and stream bottoms are important to forest grouse throughout the seasons. Blue and spruce grouse winter at high elevations. In early spring, they descend to semi-open timber areas for breeding, nesting, and rearing of chicks. Ruffed grouse inhabit the dense cover of conifers, aspen, and shrubs and are most often found along stream courses.

Blue and spruce grouse are closely associated with the distribution patterns of Douglas-fir and true fir and the soil associations that support forests with these species as components.

The ponds, reservoirs, river bottoms, and sloughs in the survey area provide an array of habitats for waterfowl during both spring and fall migration and during the summer production period. Ducks, geese, pelicans, swans, and a variety of marsh and shore birds use these water bodies for resting, nesting, and brood rearing.

Beaver, mink, and muskrat dwell in the principal watercourses, while badger, ground squirrel, coyote, and a variety of small mammals occur throughout the

survey area. Large predators, such as bobcats, mountain lions, and wolverines, may occur in most of the major mountain ranges given an adequate food supply.

Application of conservation practices that improve habitat can enhance populations of game and nongame species. These practices include

development of irregularly shaped areas around farmland, protection of such areas from fire or grazing, and establishment of woody vegetation that provides winter shelter. Increased application of commonly employed conservation practices including field windbreaks, minimum tillage, pond construction, and prescribed grazing, can enhance wildlife populations.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. Ratings are based on observed soil performance and on estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial,

industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

Additional interpretations can be made using the information in the tables, along with soil maps, soil descriptions, and other data provided in this survey.

The "Glossary" defines some of the terms used in this soil survey that have a special meaning in soil science.

Building Site Development

The "Building Site Development" table shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. Limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, open ditches, utility lines, and other purposes. Ratings are based on soil properties, site features, and observed soil performance. Ease of digging,

filling, and compacting is affected by the depth to bedrock, to a cemented pan, or to a very firm dense layer; stone content; soil texture; and slope. Depth to a seasonal high water table and susceptibility of the soil to flooding affect the time of year that excavations can be made. Soil texture and depth to the water table affect the resistance of the excavation walls or banks to sloughing or caving.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for dwellings without basements, dwellings with basements, and small commercial buildings without basements. Ratings are based on soil properties, site features, and observed soil performance. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. Ratings are based on soil properties, site features, and observed soil performance. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, potential for frost action, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Ratings are based on soil properties, site features, and observed soil performance. Soil reaction; a high water table; depth to bedrock or to a cemented pan; available water capacity in the upper 40 inches; and content of salts, sodium, and sulfidic materials affect plant growth. Flooding; wetness; slope; stoniness; and amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

The "Sanitary Facilities" table shows the degree and the kind of soil limitations that affect septic tank

absorption fields, sewage lagoons, and sanitary landfills. This table also shows the suitability of the soils for use as a daily cover for landfill.

Soil properties are important in selecting sites for sanitary facilities and in identifying limiting soil properties and site features to be considered in planning, design, and installation. Soil limitation ratings of *slight*, *moderate*, or *severe* are given for septic tank absorption fields, sewage lagoons, and trench and area sanitary landfills. Soil suitability ratings of *good*, *fair*, and *poor* are given for daily cover for landfill.

A rating of *slight* or *good* indicates that the soils have no limitations or that the limitations can be easily overcome. Good performance and low maintenance can be expected. A rating of *moderate* or *fair* indicates that the limitations should be recognized but generally can be overcome by good management or special design. A rating of *severe* or *poor* indicates that overcoming the limitations is difficult or impractical. Increased maintenance may be required.

Septic tank absorption fields are areas in which subsurface systems of tile or perforated pipe distribute effluent from a septic tank into the natural soil. The centerline of the tile is assumed to be at a depth of 24 inches. Only the part of the soil between depths of 24 and 60 inches is considered in making the ratings. Soil properties and site features considered are those that affect the absorption of the effluent, those that affect the construction and maintenance of the system, and those that may affect public health.

Ratings are based on soil properties, site features, and observed soil performance. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock, or a cemented pan, interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a

nearly level floor surrounded by cut slopes or embankments of compacted, relatively impervious soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet.

Relatively impervious soil material for the lagoon floor and sides is desirable to minimize seepage and contamination of local ground water.

The “Sanitary Facilities” table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. Ratings are based on soil properties, site features, and observed soil performance. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Trench sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers in an excavated trench. Waste is spread, compacted, and covered daily with a thin layer of soil, excavated from the trench. When the trench is full, a final cover of soil material at least 2-feet thick is placed over the landfill. Soil properties that influence the risk of pollution, the ease of excavation, trafficability, and revegetation are the major considerations in rating the soils.

Area sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers on the surface of the soil. Waste is spread, compacted, and covered daily with a thin layer of soil that is imported from a source away from the site. A final cover of soil at least 2-feet thick is placed over the completed landfill. Soil properties that influence trafficability, revegetation, and the risk of pollution are the main considerations in rating the soils for area sanitary landfills.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ratings in the “Sanitary Facilities” table are based on soil properties, site features, and observed soil performance. Permeability, depth to bedrock or to a cemented pan, a high water table,

slope, and flooding affect both types of landfill.

Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. Soil material is obtained offsite, transported to the landfill, and spread over the waste. The suitability of a soil for use as cover is based on properties that affect workability and the ease of digging, moving, and spreading the material over the refuse daily during both wet and dry periods.

Soil texture, wetness, rock fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. Soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, the most organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Waste Management

Soil properties are important when organic waste is applied as fertilizer and wastewater is applied in irrigated areas. They are also important when soil is used as a medium for treatment and disposal of organic waste and wastewater. Unfavorable soil properties can result in environmental damage.

Use of organic waste and wastewater as production resources results in energy and resource conservation and minimizes the problems associated with waste disposal. If disposal is the goal, applying a maximum amount of the organic waste or the wastewater to a minimal area holds costs to a minimum and environmental damage is the main hazard. If reuse is the goal, a minimum amount should be applied to a maximum area, then environmental damage is unlikely.

Interpretations developed for waste management may include ratings for manure- and food-processing waste; municipal sewage sludge; use of wastewater

for irrigation; and treatment of wastewater by slow rate, overland flow, and rapid infiltration processes.

Specific information regarding waste management is available from local Natural Resources Conservation Service or Cooperative Extension Service offices.

Construction Materials

The “Construction Materials” table gives information about the soils as a source of roadfill, sand, gravel, and topsoil. Soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In the “Construction Materials” table, soils are rated as a source of roadfill for low embankments, generally less than 6-feet high and less exacting in design than higher embankments.

Ratings are for soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The “Engineering Index Properties” table provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. Soil performance after it is stabilized with lime or cement is not considered in the ratings.

Ratings are based on soil properties, site features, and observed soil performance. Thickness of suitable material is a major consideration. Ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have one or more of the following characteristics: a plasticity index of more than 10, a high shrink-swell potential, many stones, slopes of more than 25 percent, or a water table at a depth of less than

1 foot. They may have layers of suitable material, but it is less than 3-feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction.

Specifications for each use vary widely. In the “Construction Materials” table, only the probability of finding material in suitable quantity in or below the soil is evaluated. Suitability of the material for specific purposes is not evaluated nor are factors that affect excavation of the material.

Properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), thickness of suitable material, and content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the “Engineering Index Properties” table.

A soil rated as a *probable* source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3-feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an *improbable* source. Fragments of soft bedrock, such as shale and siltstone, are not considered sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Reclamation potential of the borrow area is also evaluated.

Toxic material and such properties as soil reaction, available water capacity, and fertility affect plant growth. Slope, the water table, rock fragments, soil texture, and thickness of suitable material affect ease of excavating, loading, and spreading. Slope, the water table, rock fragments, bedrock, and toxic material affect reclamation of the borrow area.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils; loamy soils that have a relatively high content of clay; soils that have only 20 to 40 inches of suitable material; soils that have an appreciable amount of gravel, stones, or soluble salts; or soils that have slopes of 8 to 15 percent. Soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey; have less than 20 inches of suitable material; have a large amount of gravel, stones, or soluble salts; have slopes of more than 15 percent; or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

The “Water Management” table gives information about soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. Limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. Seepage potential is determined by permeability of the soil and depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20-feet high, constructed to impound water or to protect land against overflow. In the “Water Management” table, soils are rated as a source of material for embankment fill. Ratings apply to soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

Ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the

embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material and trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil affect excavated ponds. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving affect excavating and grading and the stability of ditchbanks. Productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. Depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope affect the design and management of an irrigation system. Large stones and depth to bedrock or to a cemented pan affect the construction of a system. Depth of the root zone, the amount of salts or sodium, and soil reaction affect the performance of a system.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. Restricted rooting depth, severe hazard of soil blowing or water erosion, excessively coarse texture,

and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock

or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of a soil survey. Data and estimates of soil and water features, listed in the tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

Estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

The "Engineering Index Properties" table gives estimates of the engineering classification and of the range of index properties for major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. Soil series descriptions in Part I of this survey give the range in depth and information on other properties of each layer.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles

coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." The "Glossary" defines textural terms.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 based on grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 based on visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments 3 to 10 inches in diameter and larger than 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The

sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area, or from nearby areas, and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

The “Physical Properties of the Soils” and “Chemical Properties of the Soils” tables show estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

The following paragraphs describe the columns in the “Physical Properties of the Soils” table.

Depth to the upper and lower boundaries of each layer is indicated. Range in depth and information on other properties of each layer are given in the series descriptions in Part I of this survey.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the largest to the smallest.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and

to retain moisture. They influence shrink-swell potential, permeability, plasticity, ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $\frac{1}{3}$ -bar moisture tension. Weight is determined after drying the soil at 105° C. In the “Physical Properties of the Soils” table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. Capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated based on the

kind and amount of clay minerals in the soil and on measurements of similar soils.

Linear extensibility is used to determine the *shrink-swell potential* of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the "Physical Properties of the Soils" table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. It affects the available water capacity, infiltration rate, and tilth. Organic matter is a source of nitrogen and other nutrients for crops.

Erosion factors are shown in the "Physical Properties of the Soils" table as the K factor (K and Kf) and the T factor. *Erosion factor K* indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility of soils to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils generally are not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material.

These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams that have more than 5 percent finely divided calcium carbonate. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils have less than 5 percent finely divided calcium carbonate. They are moderately erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils have less than 5 percent finely divided calcium carbonate. They are moderately erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils have less than 5 percent finely divided calcium carbonate. They are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of rock fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to soil blowing, or the tons per acre per year that can be expected to be lost to soil blowing. There is a close correlation between soil blowing and the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence soil blowing.

The following paragraphs describe the columns in the "Chemical Properties of the Soils" table.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH

value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the soil. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is given as the percent, by weight, of hydrated calcium sulfates in the soil. Gypsum is partially soluble in water and can be dissolved and removed by water. Soils that have a high content of gypsum (more than 10 percent) may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation; it is expressed, in millimhos per centimeter at 25° C, as the electrical conductivity of the saturation extract. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by irrigation water quality and by water application frequency. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio is the measure of sodium relative to calcium and magnesium in the water extracted from saturated soil paste. Soils having a sodium adsorption ratio of 13 or more may be characterized by increased dispersion of organic matter and clay particles, reduced permeability and aeration, and general degradation of soil structure.

Water Features

The "Water Features" table gives estimates of several important water features used in land-use planning that involves engineering considerations. These features are described in the following paragraphs.

Hydrologic soil groups are groups of soils that, when saturated, have the same runoff potential under similar storm and ground cover conditions. Soil properties affecting the runoff potential are those that influence the minimum rate of infiltration in a bare soil after prolonged wetting and when the soil is not frozen. These properties include depth to a seasonal high water table, intake rate, permeability after prolonged wetting, and depth to a very slowly permeable layer. The influences of ground cover and slope are treated independently and are not taken into account in hydrologic soil groups.

In the definitions of the hydrologic soil groups, the infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which water moves through the soil and is controlled by properties of the soil layers.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. They consist chiefly of very deep, well-drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. They consist chiefly of moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. They consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. They consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in marshes and swamps or in closed depressions is considered ponding.

The "Water Features" table gives the frequency and duration of flooding and the time of year when flooding is most likely to occur. *Frequency*, *duration*, and probable *months* of occurrence are estimated. Frequency generally is expressed as none, rare,

occasional, or frequent. *None* means flooding is not probable; *rare* that it is unlikely but is possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year).

Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 to 30 days), and *very long* (more than 30 days). The time of year that flooding is most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Water table (seasonal) is a zone of saturation at the highest average depth during the wettest season. It is at least 6-inches thick, persists in the soil for more than a few weeks, and is within 6 feet of the surface. Indicated in the "Water Features" table are depth to the seasonal high water table and the months of the year when the water table usually is highest.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation.

Soil Features

The "Soil Features" table gives estimates of several important soil features used in land-use planning that involves engineering considerations. These features are described in the following paragraphs.

Depth to bedrock is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft (paralithic) or hard (lithic). If the rock

is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well-drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

A *low* potential for frost action indicates the soil is rarely susceptible to formation of ice lenses; a *moderate* potential indicates the soil is susceptible to formation of ice lenses, resulting in frost heave and subsequent loss of soil strength; and a *high* potential indicates the soil is highly susceptible to formation of ice lenses, resulting in frost heave and subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The corrosion rate of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The corrosion rate of concrete is based mainly on sulfate and sodium content, texture, moisture content, and soil acidity.

Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For *concrete*, the risk of corrosion, also expressed as *low*, *moderate*, or *high*, is based on soil texture, acidity, and amount of sulfates in the saturation extract.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. (See Sodic (alkali) soil.)

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and areal extent from mountains to gullied terrains on hillslopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redox feature.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redox features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillite. Weakly metamorphosed mudstone or shale.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	more than 7.5

Avalanche chute. The track or path formed by an avalanche.

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillslopes. Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular

to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5-millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-floored plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of cobbles or gravel. In some blowouts, the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Bouldery. Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

Bouldery soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil material. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque. A semicircular, concave, bowl-like area that has steep faces primarily resulting from erosive activity of a mountain glacier.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeters in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

COLE (coefficient of linear extensibility). (See Linear extensibility.)

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer-textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion. In areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to

compression. Terms describing consistence are defined in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown, and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well-drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet, at or near the surface, during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salt (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well-preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hillslope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transitional zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Giant ripple mark. The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited.

Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Soil that is 15 to 35 percent, by volume, rounded or angular rock fragments up to 3 inches (7.6 centimeters) in diameter. Very gravelly soil is 35 to 60 percent gravel, and extremely gravelly soil is more than 60 percent gravel by volume.

Grazeable forestland. Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser

depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Habitat type. An aggregation of all land areas capable of producing similar climax plant communities.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 8 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material.

Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A or E horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties

include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasesers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well-sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral moraine. A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It

is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $\frac{1}{3}$ - or $\frac{1}{10}$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during its entire life.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Miscellaneous water. A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Areas of color that differ from the matrix color. These colors are commonly attributes retained from the geologic parent material. (See Redox features for indications of poor aeration and impeded drainage.)

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep

sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well-decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Naturalized pasture. Forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots.

For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percolates slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile.

Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit. The range of moisture content within which the soil remains plastic.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential natural community (PNC). The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species.

Potential rooting depth (effective rooting depth).

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

Range condition. The present composition of the plant community on a range site in relation to the

potential natural plant community for that site.
(See Similarity index.)

Range site. (See Ecological site.)

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redox concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redox depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redox features. Redox concentrations, redox depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a

change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redox feature.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, boulders, stones, cobbles, and gravel.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called

ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	0 to 4
Slightly saline	4 to 8
Moderately saline	8 to 16
Strongly saline	more than 16

Sand. As a soil separate, individual rock or mineral fragments from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments.

They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder. The uppermost inclined surface at the top of a hillside. It is the transitional zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine

sand (0.05 millimeters). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Similarity index. A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip

surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slickspot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	more than 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $\text{Ca}^{++} + \text{Mg}^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na

concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with tillage, or stones cover .01 to 0.1 percent of the surface. Very stony means that 0.1 to 3.0 percent of the surface is covered with stones. Extremely stony means that 3 to 15 percent of the surface is covered with stones.

Stony soil material. Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It

commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Tailwater. The water directly downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terracette. Small, irregular step-like forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may or may not be induced by trampling of livestock such as sheep or cattle.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Understory. Any plants in a forest community that grow to a height of less than 5 feet.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water-spreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed over wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

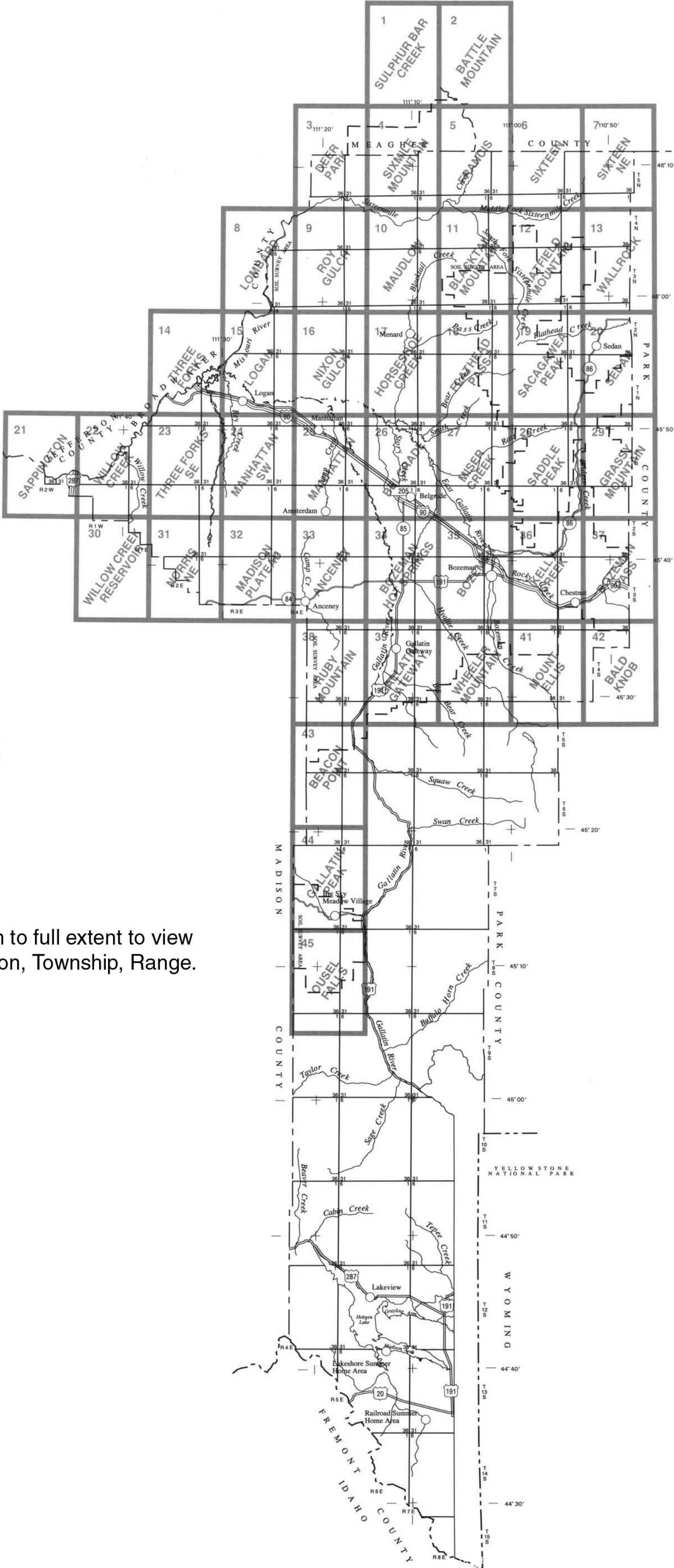
Windthrow. The action of uprooting and tipping over trees by the wind.

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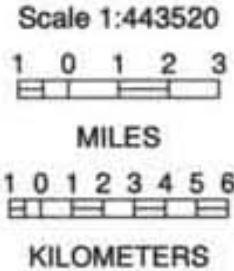
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Zoom to full extent to view
Section, Township, Range.



SECTIONALIZED TOWNSHIP					
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
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GALLATIN COUNTY, MONTANA



SOIL LEGEND

The publication symbols consist of field symbols. Symbols consist of numbers or a combination of numbers and letters, for example, 18A, 266D, 2, and 1823F. For the symbols designated by a number and a letter, the number designates the soil type and the letter designates the slope class. The symbols without a number designate a miscellaneous area. Map units are arranged numerically by field symbols.

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
2A	Havre loam, calcareous surface, 0 to 2 percent slopes	63B	Beanlake loam, 0 to 4 percent slopes	282E	Bavdark loam, 8 to 25 percent slopes
3A	Glendive sandy loam, 0 to 2 percent slopes	64B	Straw loam, 0 to 4 percent slopes	283E	Zade-Adel complex, 15 to 45 percent slopes
3C	Glendive sandy loam, 2 to 8 percent slopes	65B	Bigbear loam, 0 to 4 percent slopes	283G	Zade loam, 45 to 70 percent slopes
4A	Ryell silt loam, 0 to 2 percent slopes	65C	Bigbear loam, 4 to 8 percent slopes	284D	Redchief cobbly loam, 8 to 15 percent slopes, stony
12C	Burnel silty clay loam, 2 to 8 percent slopes	65D	Bigbear loam, 8 to 15 percent slopes	284E	Redchief cobbly loam, 15 to 35 percent slopes, stony
14C	Bowery loam, 2 to 8 percent slopes	65E	Bigbear clay loam, 15 to 35 percent slopes	290E	Jaegie loam, 15 to 35 percent slopes
18B	Clarkstone silt loam, 0 to 4 percent slopes	71C	Quigley loam, 4 to 8 percent slopes	291G	Whifore cobbly clay loam, 40 to 70 percent slopes, stony
18C	Clarkstone silt loam, 4 to 8 percent slopes	71D	Quigley loam, 8 to 15 percent slopes	293E	Stemple cobbly sandy loam, 15 to 35 percent slopes, stony
19C	Marias silty clay, 4 to 8 percent slopes	72C	Doughty loam, 4 to 8 percent slopes	293F	Stemple cobbly sandy loam, 35 to 60 percent slopes, stony
20C	Headwaters loam, 2 to 8 percent slopes	72D	Doughty loam, 8 to 15 percent slopes	294D	Yellowmule-Lonniebee, stony-Redlodge complex, 4 to 15 percent slopes
20D	Headwaters loam, 8 to 15 percent slopes	79C	Bridger loam, 2 to 8 percent slopes	294E	Yellowmule-Lonniebee, stony complex, 15 to 45 percent slopes
23B	Patouza clay, 0 to 6 percent slopes	81E	Hanson cobbly loam, 15 to 45 percent slopes, stony	294F	Yellowmule-Lonniebee complex, 35 to 60 percent slopes, stony
24C	Udecide silt loam, 4 to 8 percent slopes	82E	Phillipsburg loam, 8 to 25 percent slopes	295F	Shadow very cobbly coarse sandy loam, moist, 35 to 60 percent slopes, stony
25B	Musselshell loam, 0 to 4 percent slopes	86F	Whitecow cobbly loam, 35 to 60 percent slopes, stony	301A	Rivra-Ryell-Bonebasin complex, 0 to 2 percent slopes
26C	Sappington loam, 4 to 8 percent slopes	90F	Jaegie loam, 35 to 60 percent slopes	304A	Ryell-Rivra-Fairway complex, 0 to 2 percent slopes
27B	Busby loam, 0 to 4 percent slopes	91F	Whifore gravelly loam, 35 to 60 percent slopes, stony	307A	Sudworth silty clay loam, 0 to 2 percent slopes
28C	Birney loam, 2 to 8 percent slopes	92E	Martab loam, 15 to 45 percent slopes	314C	Adel loam, 2 to 8 percent slopes
31C	Kelstrup silt loam, 4 to 8 percent slopes	96E	Loberg very flaggy loam, cool, 15 to 35 percent slopes, very stony	314E	Adel loam, 8 to 25 percent slopes
31D	Kelstrup silt loam, 8 to 15 percent slopes	102A	Havre loam, 0 to 2 percent slopes, rare flooding	315D	Bachuster-Cabba complex, 4 to 15 percent slopes
32B	Amesha loam, 0 to 4 percent slopes	128D	Birney channery loam, 8 to 15 percent slopes	315F	Cabba-Bachbuster complex, 15 to 60 percent slopes
32C	Amesha loam, 4 to 8 percent slopes	135E	Kalsted gravelly sandy loam, 15 to 35 percent slopes	325E	Musselshell very cobbly loam, 15 to 35 percent slopes, very stony
32D	Amesha loam, 8 to 15 percent slopes	146D	Work gravelly clay loam, 8 to 15 percent slopes	336C	Brocko-Clarkstone silt loams, 4 to 8 percent slopes
32E	Amesha-Trimad complex, 15 to 45 percent slopes	149B	Beaverton cobbly loam, 0 to 4 percent slopes	336D	Brocko-Clarkstone silt loams, 8 to 15 percent slopes
32F	Amesha loam, 35 to 60 percent slopes	155F	Anceney cobbly loam, 15 to 60 percent slopes	339E	Tolbert cobbly loam, 8 to 35 percent slopes, very stony
33B	Attewan clay loam, 0 to 4 percent slopes	158B	Tamaneen clay loam, 0 to 4 percent slopes	341A	Beaverell-Beavwan loams, moderately wet, 0 to 2 percent slopes
35B	Kalsted sandy loam, 0 to 4 percent slopes	163C	Beanlake gravelly loam, 4 to 8 percent slopes	346E	Work cobbly sandy clay loam, 15 to 35 percent slopes, stony
35C	Kalsted sandy loam, 4 to 8 percent slopes	163D	Beanlake gravelly loam, 8 to 15 percent slopes	347F	Reedwest-Cabba-Castner complex, 25 to 60 percent slopes
35D	Kalsted sandy loam, 8 to 15 percent slopes	166C	Windham gravelly loam, 4 to 8 percent slopes	349C	Beaverton very cobbly loam, 2 to 6 percent slopes, very stony
36B	Brocko silt loam, 0 to 4 percent slopes	166D	Windham gravelly loam, 8 to 15 percent slopes	350B	Blackmore silt loam, 0 to 4 percent slopes
36C	Brocko silt loam, 4 to 8 percent slopes	178E	Copenhaver-Rock outcrop complex, 8 to 35 percent slopes	350C	Blackmore silt loam, 4 to 8 percent slopes
36D	Brocko silt loam, 8 to 15 percent slopes	178F	Copenhaver flaggy loam, 35 to 60 percent slopes	350D	Blackmore silt loam, 8 to 15 percent slopes
37B	Alona silty clay loam, 0 to 4 percent slopes	179E	Bridger loam, cool, 4 to 25 percent slopes	352C	Martinsdale clay loam, 4 to 8 percent slopes
38B	Chinook fine sandy loam, 0 to 4 percent slopes	182E	Bavdark gravelly coarse sandy loam, 8 to 25 percent slopes, stony	354B	Farside loam, 2 to 6 percent slopes
38C	Chinook fine sandy loam, 4 to 8 percent slopes	190E	Jaegie gravelly coarse sandy loam, 8 to 35 percent slopes	354D	Farside loam, 8 to 15 percent slopes
38D	Chinook fine sandy loam, 8 to 15 percent slopes	201A	Rivra cobbly sandy loam, 2 to 6 percent slopes	355D	Shawmut cobbly loam, 8 to 15 percent slopes, stony
38E	Chinook fine sandy loam, 15 to 35 percent slopes	207B	Nesda loam, 2 to 6 percent slopes	357B	Sourdough loam, 0 to 4 percent slopes
40C	Tanna clay loam, 4 to 8 percent slopes	212C	Burnel-Nythar complex, 2 to 8 percent slopes	358B	Tamaneen cobbly clay loam, 0 to 4 percent slopes
41A	Beaverell loam, 0 to 2 percent slopes	220C	Headwaters cobbly loam, 2 to 8 percent slopes	359C	Corbly very gravelly sandy loam, 4 to 8 percent slopes, stony
42B	Trimad loam, 0 to 4 percent slopes	225C	Musselshell cobbly loam, 2 to 8 percent slopes	360E	Alder, stony-Cabba complex, 15 to 45 percent slopes
43A	Beavwan loam, 0 to 2 percent slopes	225D	Musselshell cobbly loam, 8 to 15 percent slopes	361C	Sawicki cobbly loam, 2 to 8 percent slopes, very stony
44B	Varney clay loam, 0 to 4 percent slopes	226D	Sappington cobbly loam, 4 to 15 percent slopes	361D	Sawicki cobbly loam, 8 to 15 percent slopes, very stony
44C	Varney clay loam, 4 to 8 percent slopes	232C	Amesha cobbly loam, 2 to 8 percent slopes	362D	Breeton coarse sandy loam, 4 to 15 percent slopes
44D	Varney sandy clay loam, 8 to 15 percent slopes	239E	Tolbert, stony-Rock outcrop complex, 8 to 45 percent slopes	363D	Beanlake cobbly loam, 8 to 15 percent slopes, stony
45C	Nuley clay loam, 4 to 8 percent slopes	241A	Beaverell cobbly loam, 0 to 2 percent slopes	363E	Beanlake cobbly loam, 15 to 35 percent slopes, stony
45D	Nuley clay loam, 8 to 15 percent slopes	242B	Trimad cobbly loam, 0 to 4 percent slopes	364B	Straw silty clay loam, 0 to 4 percent slopes
46C	Work clay loam, 4 to 8 percent slopes	242C	Trimad cobbly loam, 4 to 8 percent slopes	365D	Bigbear, stony-Storyhill, very stony complex, 4 to 15 percent slopes
46D	Work clay loam, 8 to 15 percent slopes	242D	Trimad cobbly loam, 8 to 15 percent slopes	365E	Storyhill, very stony-Bigbear, stony- Adel complex, 15 to 45 percent slopes
50B	Blackdog silt loam, 0 to 4 percent slopes	242E	Trimad cobbly loam, 15 to 35 percent slopes	366D	Windham cobbly loam, 8 to 15 percent slopes, stony
50C	Blackdog silt loam, 4 to 8 percent slopes	244B	Varney cobbly loam, 0 to 4 percent slopes	366E	Windham cobbly loam, 15 to 35 percent slopes, stony
50D	Blackdog silt loam, 8 to 15 percent slopes	249A	Beaverton cobbly clay loam, 0 to 2 percent slopes	379D	Bridger cobbly loam, 8 to 15 percent slopes, stony
51B	Quagle silt loam, 0 to 4 percent slopes	252D	Martinsdale cobbly loam, 8 to 15 percent slopes	379E	Bridger cobbly loam, 15 to 35 percent slopes, stony
52B	Martinsdale loam, 0 to 4 percent slopes	254B	Clasoil cobbly sandy loam, 2 to 6 percent slopes	380D	Libeg cobbly loam, 8 to 15 percent slopes, stony
52C	Martinsdale loam, 4 to 8 percent slopes	255D	Anceney cobbly loam, 8 to 15 percent slopes	380E	Libeg cobbly loam, 15 to 35 percent slopes, stony
52D	Martinsdale loam, 8 to 15 percent slopes	257B	Meagher cobbly loam, 0 to 4 percent slopes	380F	Libeg very cobbly loam, 35 to 60 percent slopes, extremely stony
52E	Martinsdale loam, 15 to 35 percent slopes	257C	Meagher cobbly loam, 4 to 8 percent slopes	381E	Hanson, bouldery-Bridger complex, 8 to 25 percent slopes
53B	Amsterdam silt loam, 0 to 4 percent slopes	258D	Danvers cobbly clay loam, 8 to 15 percent slopes	382E	Bavdark sandy loam, moist, 8 to 35 percent slopes
53C	Amsterdam silt loam, 4 to 8 percent slopes	259B	Corbly very gravelly sandy loam, 0 to 4 percent slopes	387G	Rochester, very stony-Rock outcrop complex, 35 to 70 percent slopes
54C	Clasoil loam, 4 to 8 percent slopes	260D	Bachbuster-Wilsall complex, 4 to 15 percent slopes	388E	Vision cobbly loam, 15 to 45 percent slopes, very stony
54D	Clasoil loam, 8 to 15 percent slopes	261B	Sawicki cobbly loam, 0 to 4 percent slopes	390E	Uinta-Paddy complex, cool, 15 to 45 percent slopes
560	Rubble land-Rock outcrop complex	261C	Sawicki cobbly loam, 4 to 8 percent slopes	393E	Rocko cobbly loam, 15 to 45 percent slopes, stony
57B	Turner loam, 0 to 4 percent slopes	266B	Windham cobbly loam, 0 to 4 percent slopes	395F	Shadow very cobbly coarse sandy loam, 35 to 60 percent slopes, stony
57C	Meagher loam, 4 to 8 percent slopes	266D	Windham cobbly loam, 8 to 15 percent slopes	396E	Loberg, very stony-Danaher, stony complex, 15 to 45 percent slopes
57D	Meagher loam, 8 to 15 percent slopes	267E	Roy cobbly clay loam, 15 to 60 percent slopes	396F	Loberg very flaggy loam, 35 to 60 percent slopes, very stony
58B	Danvers silty clay loam, 0 to 4 percent slopes	272B	Doughty cobbly loam, 0 to 4 percent slopes	401A	Rivra, moist-Ryell-Bonebasin, 0 to 2 percent slopes
58C	Danvers silty clay loam, 4 to 8 percent slopes	272C	Doughty cobbly loam, 4 to 8 percent slopes	407A	Sudworth-Nesda loams, 0 to 2 percent slopes
58D	Danvers silty clay loam, 8 to 15 percent slopes	272D	Doughty cobbly loam, 8 to 15 percent slopes	410E	Blacksheep-Chinook-Rock outcrop complex, 15 to 45 percent slopes
60C	Alder clay loam, 2 to 8 percent slopes	278F	Spanpeak coarse sandy loam, 35 to 60 percent slopes	412E	Rentsac-Amesha complex, 8 to 25 percent slopes
60D	Alder-Cabba complex, 8 to 25 percent slopes	280B	Libeg cobbly loam, 0 to 4 percent slopes	414E	Adel-Libeg complex, 15 to 35 percent slopes

SOIL LEGEND

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
415D	Cabba-Reedwest complex, 4 to 15 percent slopes	516A	Binna loam, 0 to 2 percent slopes	691E	Whitore-Sicklesteets complex, 15 to 40 percent slopes, stony
425E	Musselshell-Pensore, stony complex, 15 to 35 percent slopes	517A	Saypo silt loam, 0 to 2 percent slopes, drained	691F	Whitore-Sicklesteets complex, 40 to 60 percent slopes, stony
430E	Crago-Beanlake complex, 15 to 35 percent slopes	518A	Reycreek loam, 0 to 2 percent slopes	693E	Bangtail-Timberlin, stony complex, 15 to 45 percent slopes
431B	Kelstrup-Brocko silt loams, 0 to 4 percent slopes	519A	Greycliff loam, 0 to 2 percent slopes	693F	Bangtail-Timberlin complex, 35 to 60 percent slopes, stony
431C	Kelstrup-Brocko silt loams, 4 to 8 percent slopes	520B	Bobkitty clay loam, 0 to 4 percent slopes	694F	Timberlin-Copenhaver complex, 35 to 60 percent slopes
431D	Kelstrup-Brocko silt loams, 8 to 15 percent slopes	521A	Reycreek-Toston-Slickspots complex, 0 to 2 percent slopes	695E	Arcette extremely bouldery sandy loam, 15 to 35 percent slopes
438D	Chinook-Kalsted sandy loams, 8 to 15 percent slopes	522A	Enbar clay loam, 0 to 2 percent slopes	696E	Loberg very flaggy loam, 15 to 35 percent slopes, very stony
439D	Tolbert-Blaincreek complex, 2 to 15 percent slopes	523A	Enbar-Nythar loams, cool, 0 to 4 percent slopes	701A	Rivra-Mccabe-Bonebasin complex, 0 to 2 percent slopes
439E	Tolbert-Blaincreek-Adel complex, 15 to 45 percent slopes	524A	Fairway-Bonebasin complex, 0 to 2 percent slopes	710C	Cabbart-Amesha loams, 2 to 8 percent slopes
439G	Blaincreek-Tolbert complex, 40 to 70 percent slopes	525A	Greycliff-Toston-Threeriv complex, 0 to 2 percent slopes	710D	Cabbart-Amesha loams, 8 to 15 percent slopes
442B	Trimad loam, calcareous surface, 0 to 4 percent slopes	526A	Greycliff-Rivra-Threeriv complex, 0 to 2 percent slopes	710E	Cabbart-Amesha-Trimad complex, 15 to 45 percent slopes
443A	Beavwan loam, moderately wet, 0 to 2 percent slopes	527A	Binna-Slickspots complex, moderately wet, 0 to 2 percent slopes	711E	Blacksheep-Kalsted-Scravo complex, 15 to 45 percent slopes
447E	Reedwest-Adel-Castner complex, 15 to 45 percent slopes	528A	Greycliff-Lamoose silt loams, 0 to 2 percent slopes	712D	Rentsac-Rock outcrop complex, 8 to 15 percent slopes
448A	Hyalite-Beaverton complex, moderately wet, 0 to 2 percent slopes	537A	Lamoose silt loam, 0 to 2 percent slopes	712E	Rentsac-Rock outcrop complex, 15 to 60 percent slopes
450B	Blackdog-Quagle silt loams, 0 to 4 percent slopes	538A	Tetonview silt loam, 0 to 2 percent slopes	714E	Adel-Uinta loams, 8 to 35 percent slopes
450C	Blackdog-Quagle silt loams, 4 to 8 percent slopes	539A	Tetonview silt loam, 0 to 2 percent slopes, drained	715F	Norbert-Bacbuster complex, 15 to 60 percent slopes
450D	Blackdog-Brodyk silt loams, 8 to 15 percent slopes	540A	Tetonview-Newtman complex, 0 to 2 percent slopes	716E	Pensore-Brocko-Rock outcrop complex, 15 to 45 percent slopes
451C	Quagle-Brodyk silt loams, 4 to 8 percent slopes	541A	Lamoose-Rivra-Bonebasin complex, 0 to 2 percent slopes	721E	Abor-Rock outcrop complex, 15 to 45 percent slopes
451D	Quagle-Brodyk silt loams, 8 to 15 percent slopes	542A	Blossberg loam, 0 to 2 percent slopes	723C	Patouza-Abor complex, 2 to 8 percent slopes
451E	Quagle-Brodyk silt loams, 15 to 45 percent slopes	544A	Bigsandy-Slickspots complex, 0 to 2 percent slopes	724C	Udecide-Cabbart complex, 4 to 8 percent slopes
452B	Quigley-Beanlake complex, 0 to 4 percent slopes	547E	Hoppers-Adel-Tolbert, very stony complex, 15 to 45 percent slopes	724D	Udecide-Cabbart complex, 8 to 15 percent slopes
452C	Quigley-Beanlake loams, 4 to 8 percent slopes	550E	Bridger-Redlodge complex, 4 to 25 percent slopes	724E	Udecide-Cabbart complex, 15 to 45 percent slopes
452D	Quigley-Beanlake loams, 8 to 15 percent slopes	556A	Threeriv-Bonebasin loams, 0 to 2 percent slopes	727B	Busby-Birney complex, 0 to 4 percent slopes
452E	Quigley-Beanlake loams, 15 to 45 percent slopes	557A	Newtman mucky peat, 0 to 2 percent slopes	727D	Busby-Birney complex, 4 to 15 percent slopes
453B	Amsterdam-Quagle silt loams, 0 to 4 percent slopes	558C	Newtman-Amsterdam complex, 2 to 8 percent slopes	729E	Shurley-Rentsac-Rock outcrop complex, 8 to 35 percent slopes
453C	Amsterdam-Quagle silt loams, 4 to 8 percent slopes	559A	Threeriv-Bonebasin loams, 0 to 2 percent slopes, irrigation induced wetness	730C	Crago-Pensore gravelly loams, 4 to 15 percent slopes
453D	Amsterdam-Brodyk silt loams, 8 to 15 percent slopes	561A	Threeriv-Greycliff complex, 0 to 2 percent slopes	730E	Crago-Pensore-Rock outcrop complex, 15 to 45 percent slopes
454D	Bielenberg-Catgulch, very stony complex, 4 to 15 percent slopes	579E	Bangtail-Adel, cool, loams, 8 to 25 percent slopes	734B	Crago-Musselshell complex, 0 to 4 percent slopes
454E	Bielenberg-Catgulch, very stony- Breeton complex, 15 to 45 percent slopes	580E	Libeg, very stony-Copenhaver, extremely stony-Adel complex, 15 to 45 percent slopes	734C	Crago-Musselshell complex, 4 to 8 percent slopes
457A	Turner loam, moderately wet, 0 to 2 percent slopes	582E	Bavdark, moist-Bavdark-Mooseflat loams, 4 to 25 percent slopes	734D	Crago-Musselshell complex, 8 to 15 percent slopes
458C	Danvers-Quagle complex, 4 to 8 percent slopes	590E	Jaegie-Shadow, stony complex, 15 to 45 percent slopes	739D	Tolbert, stony-Rock outcrop complex, 8 to 15 percent slopes
458D	Danvers-Quagle complex, 8 to 15 percent slopes	592E	Yellowmule-Ouselfal, very stony complex, 8 to 25 percent slopes	739E	Tolbert, stony-Rock outcrop complex, 15 to 60 percent slopes
461D	Sawicki cobbly loam, 8 to 25 percent slopes, bouldery	592F	Ouselfal, very stony-Yellowmule complex, 35 to 60 percent slopes	740D	Tanna-Udecide complex, 8 to 15 percent slopes
461G	Tiban-Adel complex, 40 to 70 percent slopes	593E	Lonniebee-Cowood complex, 15 to 35 percent slopes	740E	Tanna-Udecide complex, 15 to 35 percent slopes
463B	Beanlake silt loam, moderately wet, 1 to 4 percent slopes	593F	Lonniebee-Cowood complex, 35 to 60 percent slopes	741A	Beaverell-Beavwan complex, 0 to 2 percent slopes
466E	Windham cobbly loam, 15 to 45 percent slopes, stony	596E	Loberg, very stony-Yellowmule, stony-Redlodge complex, 4 to 35 percent slopes	742F	Trimad cobbly loam, moist, 35 to 60 percent slopes
470D	Absarook-Tolbert complex, 4 to 15 percent slopes	603A	Meadowcreek-Rivra complex, 0 to 2 percent slopes	745E	Nuley-Rentsac-Rock outcrop complex, 15 to 45 percent slopes
478E	Tiban-Castner channery loams, 15 to 45 percent slopes	605A	Bandy-Bonebasin loams, 0 to 2 percent slopes	747E	Cabba-Reedwest-Anceney complex, 15 to 45 percent slopes
478G	Tiban-Castner channery loams, 45 to 70 percent slopes	606A	Bandy-Riverwash-Bonebasin complex, 0 to 2 percent slopes	748A	Hyalite-Beaverton complex, 0 to 4 percent slopes
479E	Bangtail-Bridger complex, 15 to 45 percent slopes	608B	Beehive-Mooseflat complex, 0 to 4 percent slopes	752E	Meagher-Shawmut-Bowery complex, 15 to 45 percent slopes
479F	Bangtail clay loam, 35 to 60 percent slopes	608D	Beehive-Mooseflat complex, 4 to 8 percent slopes	755F	Anceney-Trimad-Meagher complex, 15 to 60 percent slopes
480E	Libeg, stony-Copenhaver complex, 15 to 45 percent slopes	614D	Adel loam, cool, 4 to 15 percent slopes	760C	Billman-Wilsall clay loams, 2 to 8 percent slopes
481E	Hanson loam, 8 to 25 percent slopes	614F	Adel loam, 15 to 60 percent slopes	760E	Billman-Wilsall clay loams, 8 to 25 percent slopes
482C	Philipsburg-Libeg complex, 4 to 8 percent slopes	615F	Cabba-Castner complex, 15 to 60 percent slopes	761E	Sawicki, stony-Catgulch, very stony complex, 15 to 35 percent slopes
483F	Zade-Timberlin, stony complex, 35 to 60 percent slopes	630E	Crago-Pensore-Rock outcrop complex, 15 to 45 percent slopes, very stony	761F	Sawicki-Catgulch complex, 35 to 60 percent slopes, very stony
487E	Catgulch, bouldery-Rock outcrop complex, 8 to 35 percent slopes	639E	Shawmut-Tolbert complex, 15 to 45 percent slopes, very stony	766E	Windham, stony-Lap, very stony- Hanson complex, 15 to 45 percent slopes
490E	Uinta-Paddy complex, 15 to 45 percent slopes	647E	Hoppers, stony-Tolbert, very stony-Timberlin complex, 15 to 35 percent slopes	768C	Farnuf-Absarokee complex, 4 to 8 percent slopes
491E	Hanson-Whitore, stony complex, 15 to 45 percent slopes	647F	Hoppers, stony-Tolbert, very stony-Timberlin complex, 35 to 60 percent slopes	768D	Farnuf-Absarokee-Tolbert complex, 8 to 15 percent slopes
492E	Yellowmule-Ouselfal complex, 8 to 25 percent slopes	652D	Martinsdale-Shawmut complex, 8 to 15 percent slopes, very stony	769D	Absarokee-Work-Tolbert complex, 4 to 15 percent slopes
492F	Ouselfal-Yellowmule complex, 35 to 60 percent slopes	652E	Martinsdale-Shawmut complex, 15 to 35 percent slopes, very stony	770F	Castner-Reedwest-Rock outcrop complex, 25 to 60 percent slopes
493F	Stemple very cobbly loam, 25 to 60 percent slopes, stony	654E	Catgulch, very stony-Bielenberg- Rock outcrop complex, 15 to 45 percent slopes	778F	Spanpeak-Bavdark coarse sandy loams, 25 to 50 percent slopes
494E	Bangtail-Timberlin, stony complex, moist 15 to 45 percent slopes	654G	Catgulch, very stony-Rock outcrop complex, 55 to 75 percent slopes	779E	Bridger-Libeg, stony complex, 8 to 25 percent slopes
494F	Bangtail-Timberlin complex, moist, 35 to 60 percent slopes, stony	658B	Durston silty clay loam, 0 to 4 percent slopes	782D	Barbarela-Poin, stony-Bavdark complex, 4 to 15 percent slopes
495F	Shadow, stony-Cowood, very stony complex, 35 to 60 percent slopes	658C	Durston silty clay loam, 4 to 8 percent slopes	782E	Barbarela-Poin, stony-Bavdark complex, 15 to 45 percent slopes
495G	Shadow, stony-Cowood, very stony complex, 60 to 75 percent slopes	658D	Durston silty clay loam, 8 to 15 percent slopes	786F	Whitecow, stony-Lap, very stony- Rock outcrop complex, 35 to 60 percent slopes
496D	Bridger-Ouselfal, very stony-Redlodge complex, 4 to 15 percent slopes	660F	Billman, stony-Bangtail-Tolbert, stony complex, 25 to 60 percent slopes	787F	Catgulch, very stony-Spanpeak, stony-Bavdark complex, 25 to 60 percent slopes
496E	Ouselfal, very stony-Bridger-Redlodge complex, 4 to 45 percent slopes	661E	Sawicki cobbly loam, moist, 8 to 25 percent slopes, very stony	790E	Accola-Whitore, stony complex, 15 to 45 percent slopes
500A	Bobkitty-Bonebasin complex, 0 to 2 percent slopes	663B	Beanlake-Corby complex, 0 to 4 percent slopes	792D	Danaher, stony-Loberg, very stony complex, 8 to 15 percent slopes
502A	Toston loam, 0 to 2 percent slopes	665D	Storyhill-Bigbear complex, 4 to 15 percent slopes	792E	Danaher, stony-Loberg, very stony complex, 15 to 45 percent slopes
503A	Meadowcreek, slightly saline-Rivra complex, 0 to 2 percent slopes	665E	Bigbear-Storyhill-Adel complex, 15 to 45 percent slopes	794G	Lonniebee-Cowood complex, warm, 40 to 70 percent slopes
504A	Meadowcreek silty clay loam, 0 to 2 percent slopes	666E	Windham, stony-Lap, very stony complex, 15 to 45 percent slopes	796E	Loberg, very stony-Yellowmule complex, 8 to 35 percent slopes
505A	Fairway-Rivra complex, 0 to 2 percent slopes	666F	Lap-Windham-Rock outcrop complex, 35 to 60 percent slopes	801A	Rivra-Emyd-Greycliff complex, 0 to 2 percent slopes, protected
506A	Saypo silt loam, 0 to 2 percent slopes	668C	Farnuf-Absarook-Tolbert complex, 2 to 8 percent slopes	810E	Cabbart, moist-Amesha-Trimad complex, 15 to 45 percent slopes
507A	Soapcreek-Bonebasin complex, 0 to 2 percent slopes	668D	Absarook-Farnuf-Tolbert complex, 4 to 15 percent slopes	811E	Blacksheep, moist-Kalsted-Scravo complex, 15 to 45 percent slopes
508A	Fairway-Threeriv-Rivra complex, 0 to 2 percent slopes	670E	Castner, very stony-Quigley, very stony-Rock outcrop complex, 15 to 45 percent slopes	812E	Tolex very channery coarse sandy loam, 15 to 45 percent slopes
509B	Enbar loam, 0 to 4 percent slopes	678E	Tiban, stony-Bridger complex, 4 to 25 percent slopes	812G	Tolex very channery coarse sandy loam, 45 to 70 percent slopes
510B	Meadowcreek loam, 0 to 4 percent slopes	679D	Bangtail-Adel loams, 4 to 25 percent slopes	814D	Adel-Copenhaver complex, 4 to 15 percent slopes
511A	Fairway silt loam, 0 to 2 percent slopes	679E	Bangtail-Copenhaver complex, 8 to 25 percent slopes	814E	Adel-Copenhaver complex, 15 to 35 percent slopes
512B	Enbar-Nythar loams, 0 to 4 percent slopes	679F	Bangtail-Copenhaver complex, 35 to 60 percent slopes	816D	Pensore-Rock outcrop complex, 4 to 15 percent slopes
512D	Enbar-Bowery-Nythar complex, 4 to 15 percent slopes	680F	Tiban cobbly loam, 35 to 60 percent slopes, stony	816E	Pensore-Rock outcrop complex, 15 to 45 percent slopes
513A	Meadowcreek-Bonebasin complex, 0 to 2 percent slopes	681E	Raynesford, stony-Hanson, very stony complex, 8 to 25 percent slopes	816G	Pensore-Rock outcrop complex, 45 to 70 percent slopes
514A	Soapcreek silty clay loam, 0 to 2 percent slopes	689F	Reedwest-Cabba complex, 35 to 60 percent slopes	830E	Crago-Scravo complex, 15 to 45 percent slopes
515A	Saypo-Tetonview complex, 0 to 2 percent slopes, hummocky	690E	Accola-Whitore, stony complex, cool, 15 to 45 percent slopes	839F	Vision, very stony-Tolbert, very stony-Rubble land complex, 35 to 60 percent slopes

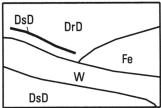

























SOIL LEGEND

SYMBOL	NAME
847F	Hoppers, stony-Tolbert, very stony- Rock outcrop complex, 35 to 60 percent slopes
852D	Martinsdale-Cabba complex, 8 to 15 percent slopes
858C	Durston cobbly clay loam, 4 to 8 percent slopes
858D	Durston cobbly clay loam, 8 to 15 percent slopes
860D	Bacbuster-Wilsall-Castner complex, 4 to 15 percent slopes
860E	Bacbuster-Wilsall-Castner complex, 15 to 45 percent slopes
860F	Billman-Adel-Tolbert complex, 25 to 60 percent slopes
866E	Windham, stony-Hanson-Lap, stony complex, 8 to 35 percent slopes
869D	Absarokee-Tolbert complex, 4 to 15 percent slopes
869E	Absarokee-Tolbert-Rock outcrop complex, 15 to 45 percent slopes

SYMBOL	NAME
870D	Tolbert-Absarook-Rock outcrop complex, 4 to 15 percent slopes
870E	Tolbert-Absarook-Rock outcrop complex, 15 to 35 percent slopes
879E	Bangtail-Copenhaver-Adel complex, 15 to 35 percent slopes
890E	Jaegie-Shadow, stony complex, cool, 15 to 45 percent slopes
892F	Marlab-Bangtail complex, 25 to 60 percent slopes, stony
894F	Rocko, stony-Copenhaver, extremely stony complex, 35 to 60 percent slopes
912E	Tolex very channery coarse sandy loam, moist, 15 to 45 percent slopes
912G	Tolex very channery coarse sandy loam, moist, 45 to 70 percent slopes
930F	Crago, stony-Quigley-Rock outcrop complex 25 to 60 percent slopes
947E	Reedwest-Cabba-Bowery complex, 15 to 45 percent slopes

SYMBOL	NAME
960E	Billman-Wilsall-Tolbert complex, 8 to 45 percent slopes
966E	Windham, stony-Rock outcrop complex, 15 to 45 percent slopes
970D	Beenom loam, 4 to 15 percent slopes
970F	Beenom, stony-Rock outcrop complex, 15 to 60 percent slopes
979E	Bangtail-Doby-Redlodge complex, 4 to 45 percent slopes
988F	Beenom, stony, moist-Rock outcrop complex, 35 to 60 percent slopes
991F	Whitore-Rock outcrop complex, 35 to 70 percent slopes
993E	Cowood channery loam, 15 to 45 percent slopes, very stony
995G	Shadow, bouldery-Rubble land complex, 40 to 70 percent slopes

CONVENTIONAL AND SPECIAL
SYMBOLS LEGEND

SOIL SURVEY FEATURES		CULTURAL FEATURES	
SOIL DELINEATIONS AND SYMBOLS		BOUNDARIES	
		County or parish	
		Reservation (national or state forest or park)	
		Limit of soil survey (label)	
		Map sheet neatline	
		Public land survey system section boundary	
		ROAD EMBLEMS & DESIGNATIONS	
		Interstate	
		Federal	
		State	
			
			
			
			
			
			
			
			
			
			
			
			
			
			
			
			
			

Symbol Definitions

LABEL	NAME	DESCRIPTION
✱	Clay spot	A spot where the surface texture is silty clay or clay in areas where the surface layer is sandy loam, loam, silt loam, or coarser. Typically 0 to 5 acres.
YAYAYAYAYAYAYAY	Escarpment, bedrock	A relatively continuous and steep slope or cliff, which was produced by erosion or faulting, that breaks the general continuity of more gently sloping land surfaces. Exposed material is hard or soft bedrock.
✕	Gravel pit	An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel. Typically less than 5 acres.
∴	Gravelly spot	A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area of surrounding soil with less than 15 percent fragments. Typically less than 5 acres.
☹	Marsh or swamp	A water-saturated, very poorly drained area, intermittently or permanently covered by water. Sedges, cattails, and rushes dominate marsh areas. Trees or shrubs dominate swamps. Not used in map units where the named components are “poorly drained” or “very poorly drained.” Typically less than 5 acres.
✂	Mine or quarry	An open excavation from which soil and underlying material are removed, exposing the bedrock. Also used to denote surface openings to underground mines. Typically less than 5 acres.
▼	Rock outcrop	An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where “Rock outcrop” is a named component of the map unit. Typically less than 5 acres.
+	Saline spot	An area where the surface layer has an electrical conductivity (EC) of 8 mmhos cm ⁻¹ more than the surface layer of the named soils in the surrounding map unit, which have an EC of 2 mmhos cm ⁻¹ or less. Typically less than 5 acres.
✱	Sandy spot	A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils of the surrounding map unit is very fine sandy loam or finer. Typically less than 5 acres.
≡	Severely eroded spot	An area where on the average 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units with component phases that are named severely eroded, very severely eroded, or gullied. Typically less than 5 acres.
.....	Short, steep slope	Narrow soil area that has slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.
ㄣ	Slide or slip	A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces. Typically less than 5 acres.
∅	Sodic spot	An area where the surface layer has a sodium adsorption ratio that is at least 10 more than the surface layer of the named soils in the surrounding map unit, which have a sodium adsorption ratio of 5 or less. Typically less than 5 acres.
≡	Spoil area	A pile of earthy materials, smoothed or uneven, resulting from human activity. Typically less than 5 acres.
◊	Stony spot	A spot where 0.01 to 0.10 percent of the surface cover is rock fragments that are greater than 10 inches in diameter in areas where the surrounding soil has no surface stones. Typically less than 5 acres.
⊙	Very stony spot	A spot where 0.1 to 3.0 percent of the surface cover is rock fragments that are greater than 10 inches in diameter in areas where the surrounding soil has less than 0.01 percent of a surface cover of stones. Typically less than 5 acres.
⚡	Wet spot	A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit. Typically less than 5 acres.